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ABSTRACT

This document presents an overview of and recommendations concerning the agricultural programs in California public higher education. Some of the recommendations are: (1) all new programs, options, and courses should be screened on a regular basis to determine if collaborative action would not lead to improvement; (2) ways and means of increasing cooperative efforts between and among institutions should be explored; (3) colleges of agriculture must join with other elements of the institution in both instructional and research programs; (4) there should be no extension of formal programs in agriculture to additional campuses of the University or State College System; (5) no new option should be approved without close examination of the possibility of collaborative effort with other units of the institution; (6) thoughtful curricular reform is needed; (7) courses in judging livestock and other agricultural commodities should be discontinued as credit offerings; and (8) no more than 4 semester hours in supervised work projects should be allowed for credit toward the Associate of Arts degree or for transfer and no more than 8 semester hours of this type should be allowed toward the baccalaureate. Other recommendations are made concerning the specific campuses. (HS)

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COUNCIL REPORT 71-8

OCTOBER 1971

Agricultural Programs in California Public Higher Education

George A. Gries

U.S. DEPARTMENT OF HEALTH,
EDUCATION & WELFARE
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State of California

Coordinating Council for Higher Education

Agricultural Programs
in
California
Public Higher Education

A Report
prepared for the
Coordinating Council for Higher Education

By
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Council Report 71-8
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FOREWORD

At its July 1969 meeting, the Council unanimously adopted a resolution resulting from a survey of educational offerings and academic plans. The resolution directed the Director to implement "five recommendations relating to the educational program survey and the Council's role in academic planning to the extent that this can be done within the budget for 1969-70." Six subject areas were identified for special study. I noted in my report to the Council that the competency of the small Council staff in these areas is limited. Consequently, these studies were designated to be conducted by consultants who are recognized authorities in the respective field. Contract funds in the Council's 1969-70 budget were sufficient to cover the cost of studies in only two of the six subject areas identified -- Criminal Justice and Agriculture. These consultants are assisted by Council staff and representative Advisory Committees whose members are knowledgeable in various aspects of the subject.

Dr. George A. Gries was retained as the consultant for the study of education programs in Agriculture. Dr. Russell L. Riese, Chief Higher Education Specialist, served as Project Director and coordinated staff assistance to the author during the study, working closely with him in all phases of its design and implementation. Mr. Donald G. Ridenour, of the Council's staff, provided editorial assistance in preparing the final version of this report.

An Advisory Committee on Agriculture was established by Dr. Riese in conjunction with the study. (See Appendix for a listing of members.) It convened at the beginning of this study to evaluate its proposed objectives, approach, and scope and to provide guidance regarding this study effort. The Committee convened again to review a draft of the final report and to advise the author of the study in respect to its content, findings, and recommendations. The material in the report is the responsibility of the author. The content, conclusions and recommendations in the report may not necessarily reflect entirely the views of each member of the Advisory Committee.

On behalf of Dr. Gries, the Council, and higher education in California, I wish to express appreciation to the members of the Advisory Committee, faculty, students, and administration from various campuses who so willingly assisted Dean Gries during the course of the study.

OWEN ALBERT KNORR
Director

ABOUT THE AUTHOR

Dr. George A. Gries, Dean of the College of Arts and Sciences, Oklahoma State University, and Consultant to the Council on Agricultural Programs in California Public Higher Education, has had extensive experience in agriculture, research, biology and academic administration.

Dr. Gries received the A.B. degree from Miami University (Botany-Chemistry), the M.S. degree from Kansas State University (Plant Physiology-Plant Pathology), and the Ph.D. degree from the University of Wisconsin (Plant Physiology-Plant Pathology).

In addition to his being a co-author of three books on plant science, he has published over fifty articles in journals and bulletins. He has served in various professional capacities including Assistant Plant Pathologist, Connecticut Agricultural Experiment Station; Professor of Agricultural Botany and Plant Physiology, Purdue University; Research Demonstrator in Botany, University of Wales; and Head, Department of Plant Pathology, University of Arizona, where he also served as Professor and Acting Head, Department of Botany. Immediately prior to his appointment as Dean of the College of Arts and Sciences at Oklahoma State University in 1968, he served three years as the head of the Department of Biological Sciences at the University of Arizona.

Dr. Gries is a member of the Advisory Committee for the Autonomous University of Guadalajara and the Consultants Bureau for the Office of Biological Education, member of the Commission on Undergraduate Education in Biological Sciences, a representative of the American Phytopathological Society on the Executive Council of the American Institute of Biological Sciences, and was a charter member of the former Commission on Education in Agriculture and National Resources.

In addition to his membership in numerous professional and honor societies, he was elected a Fellow of the American Association for the Advancement of Science in 1963 and has served on numerous examining panels for the National Science Foundation and the North Central Association of Colleges and Secondary Schools.

Russell L. Riese
Project Director

STAFF COMMENTS AND RECOMMENDATIONS ON AGRICULTURAL PROGRAMS IN CALIFORNIA PUBLIC HIGHER EDUCATION

I. INTRODUCTION

Dr. George A. Gries, Dean of the College of Arts and Sciences at Oklahoma State University, served as consultant to the Coordinating Council staff in its review of agricultural programs in California. Dr. Gries presented his report -- Agricultural Programs in California Public Higher Education -- to the Council in October 1971. Subsequently, the Council recommended that segmental staff and advisory groups be given additional time to analyze the report before submitting their comments to the Council staff for review. The segmental responses to the report's recommendations, together with comments by Council staff, follow in section II.

In working with Dr. Gries, Council staff arrived at many of the same conclusions he did. However, Council staff has since modified its position on some of the author's recommendations on the basis of information that was not available to Dr. Gries at the time of his study.

It should also be noted that a draft of Dr. Gries' report was distributed simultaneously to all campuses with agricultural programs, to segmental central offices, and to members of the Ad Hoc Advisory Committee on Agriculture and Natural Resources, and that many of the salient recommendations of the report have already been implemented or are being thoroughly examined.

Generally, Council staff was impressed quite favorably with the high quality of campus staffs and programs. Several campuses have outstanding facilities. Students interviewed reported general satisfaction and, in some cases, an infectious enthusiasm for their instructors, programs, and facilities.

Council staff is of the opinion that Dr. Gries' report has been a major contribution to California agricultural education, leading to re-evaluation of programs by faculty and administration and to closer intersegmental cooperation.

In the area of agricultural employment, a study was conducted recently by the Liaison Committee on Agriculture and Natural Resources in cooperation with the Department of Applied Behavioral Sciences at the University of California, Davis. A summary of the findings of the study are contained in Appendix A.

Based upon association with Dr. Gries, visits to campuses, and discussions and correspondence with concerned individuals and groups throughout the State, Council staff has prepared the recommendations on agricultural programs that appear in this agenda item. As a general statement, Council staff feels that California is fortunate in having a rich diversity of programs in agriculture appropriately distributed by geographic region. It appears that there is no need for additional State College, Community College, or University campuses to add programs in agriculture at this time; there may be need, however, for several campuses to consider modification of existing programs. Maps indicating campus locations of current agricultural programs appear in Appendix B.

Agriculture is a dynamic industry. As the nation's leading agricultural state, California must continue to improve programs of education and research on its high school, college and university campuses to meet new challenges.

II. RECOMMENDATIONS, RESPONSES, AND COMMENTS

The recommendations made by Dr. Gries as a result of his study of agricultural programs, the responses of the three public segments, and comments by Council staff follow:

RECOMMENDATION 1

Intra-Institutional Cooperation

> *All new programs, new options, and new courses (as well as existing ones) should be screened on a regular basis to determine if collaborative action would not lead to improvement. Flagrant duplication of courses and programs should be eliminated.*

A. SEGMENTAL RESPONSES

1. University of California

We agree that there should be optimum integration of instruction in agriculture with other disciplines in each institution. This is desirable for both cost and pedagogical reasons, and practice in the University already conforms to this principle. Our programs of instruction in agriculture do make extensive use of course offerings in other disciplines and schools. We do not have in the University "autonomous" programs in agriculture such as are described in the Gries report.

2. California State University and Colleges

No new degree majors or options within existing majors can be implemented without having complete review and approval on campus, review and approval by the Chancellor's Office, and in many instances, review and comment by the Coordinating Council for Higher Education. In addition, existing programs are subject to campus and system performance review, the results of which are reported to the Board of Trustees annually. Each of the State Colleges, in coordination with the Office of the Chancellor, has initiated an annual study of course enrollments to ensure that all budgeted courses meet minimum size standards and to avoid unnecessary course duplication.

3. California Community Colleges

Courses are screened on a regular basis by Community College deans of instruction and local agriculture advisory committees. Community College agriculture departments use the expertise of other disciplines to augment instruction in agriculture. This should, indeed, be the procedure in all institutions.

B. COUNCIL STAFF COMMENTS

Segmental policies already conform to this recommendation, particularly as a result of the Council's study of high cost programs, which requested the segments to develop policies on minimum class size and measures of productivity.[1] Agriculture programs lie outside the defined academic "core" area for both the University of California and the California State University and Colleges; therefore, requests for new programs in agriculture will normally come to the Council for review and comment. Core areas for the Community Colleges have not yet been defined, but it may be presumed that agriculture will lie outside the core area of that segment also.

RECOMMENDATION 2

Inter-Institutional Cooperation

The Liaison Committee on Agricultural and Natural Resources of the Articulation Conference should explore ways and means of increasing cooperative efforts between and among institutions. Because of the cost of certain facilities, the need for faculty specialists, and the existence of real but low demand by students for some programs, much could be accomplished through joint use of facilities and manpower.

A. SEGMENTAL RESPONSES

1. University of California

We agree fully with the suggestion that the Liaison Committee on Agricultural and Natural Resources of the Articulation Conference should continue to explore ways and means to increase cooperation between and among the public institutions of higher education.

2. California State University and Colleges

The Articulation Conference Committee for Agricultural and Natural Resources is already taking action to coordinate student transfer from Community Colleges to the State Colleges. The State Colleges are also planning a system whereby students can spend a term or an academic year at another of the State Colleges in order to gain specialized training which is not available at their home campuses. The possibility of broadening the base for utilizing low demand facilities will be studied further.

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[1] Higher Cost Programs in California Public Higher Education, CCHE Report No. 71-3, March, 1971.

3. California Community Colleges

The Liaison Committee on Agricultural and Natural Resources of the Articulation Conference should continue to explore, where feasible, ways and means of increasing cooperative efforts between and among institutions. Community College deans of instruction are moving in this direction, and the University and State Colleges are being utilized by Community College agricultural instructors as resource personnel. State College facilities are now being leased by Community College districts and utilized by Community College agricultural instructors.

B. COUNCIL STAFF COMMENTS

Further "exploration" by the liaison Committee is not sufficient. The segments themselves must become actively involved in the joint use of facilities and personnel. The Council has already requested from the segments a brief annotated list of current examples of interinstitutional and intersegmental cooperation in agricultural programs, as well as suggestions of other academic areas for future consideration.

At its July meeting, the Council received a report entitled "Facility Sharing Among Institutions of Higher Education in California."[1] The report included examples of facilities sharing in institutions outside California and an inventory of such sharing of facilities within California. While the report presented a partial inventory of facilities sharing, it overlooked many excellent examples of this form of educational cooperation. The "Analysis of the Budget Bill, 1972-73" contains the following recommendation.

> We recommend that the Legislature direct the University of California and the California State Colleges to develop and report their plans to the California Council for Higher Education for increased interinstitutional use of facilities listed below. [The list includes agricultural facilities]. In addition, it should direct the segments to use cooperative arrangements as a major criteria in the project approval process.

An intersegmental committee has been appointed to follow up on the Council's report on facility sharing. The segments have indicated their willingness to respond to suggestions and proposals resulting from the work of this committee. Council staff has every reason to believe that the committee will be able to make reasoned judgments about the potentialities for increased sharing.

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[1] CCHE Report No. 71-7, July, 1971.

RECOMMENDATION 3

Control on the Expansion of the Scope of Programs in Agriculture

Units of agriculture in academic institutions must awake to the realization that they no longer have a corner on the expertise for problem solving or the concern of those problems. It is imperative that colleges of agriculture join together with other elements of the institution in both instructional and research programs. They have been apart from the rest of the academic community too long. The high level of autonomy which they enjoy is obsolete, and steps should be taken by all administrators to break the expensive barriers that distinguish one college or division from another. In the eyes of the student and in the totality of knowledge, such distinctions do not exist.

A. SEGMENTAL RESPONSES

1. University of California

Our reaction to this recommendation is similar to that given in Recommendation 1 above. There should be careful screening of proposed new programs, and this now is the practice in the University at both campus and University-wide levels.

2. California State University and Colleges

One function of the performance review procedures referred to above is to study means of developing greater inter-departmental and inter-school or inter-divisional coordination. This includes drawing upon course work offered by various departments rather than duplicating course offerings. The State Colleges School of Agriculture question the statement that "they no longer have a corner on the expertise for problem solving or the concern for those problems," for this has not been their approach as demonstrated by the large number of science and other non-agriculture courses taught outside of the Schools of Agriculture but which are required for the Agriculture degree major in the State Colleges.

3. California Community Colleges

No comments at this time.

B. COUNCIL STAFF COMMENTS

Continual review of new and existing degree programs, or options within degree programs, is now in effect at the University of

California and the California State University and Colleges. One of the concerns of this recommendation is the redundancy of courses. Schools or Departments of Agriculture currently offer courses quite similar in description to those offered in departments of biology, business, economics, engineering, home economics, industrial arts and technology, and mathematics. Council staff supports the consultant's recommendation that these various departments cooperate in a joint review of programs.

RECOMMENDATION 4

University and State Colleges: New Programs

There should be no extension of formal programs in agriculture to additional campuses of the University or State College system.

A. SEGMENTAL RESPONSES

1. University of California

We agree that there should be no extension of formal programs in production agriculture to additional campuses of the University.

2. California State University and Colleges

The State Colleges are in full agreement with the recommendation that no additional colleges be authorized to offer programs in Agriculture.

3. California Community Colleges

No comments at this time.

B. COUNCIL STAFF COMMENTS

The University's response to this recommendation covers only production agriculture and makes no mention of other specializations within the field. In later correspondence, the University stated that "... it had no intention of extending formal programs in agriculture, as traditionally defined, to campuses other than Berkeley, Davis, and Riverside. If any questions about the definition of agriculture should arise they can be dealt with through our existing academic programs review agreements." The University undoubtedly will comply with the full scope of the recommendation until such time that it can clearly be shown that programs in agriculture are needed at additional University campuses. At the present time, there is no evidence to justify such a need.

The California State University and Colleges concur with the recommendation.

With regard to the Community Colleges, it appears doubtful that additional programs in agriculture are needed at this time. However, if a new program is initiated at a Community College campus, the Council staff should be advised.

RECOMMENDATION 5

All Institutions: New Options

> *No new option should be approved without close examination of the possibility of collaborative effort with other units of the institution (e.g., wildlife and forestry with biology, agricultural business with business, welding and tractor repair with related technical departments).*

A. SEGMENTAL RESPONSES

1. University of California

Since as indicated under Recommendations 1 and 3, the suggested review processes already are a part of the University system, we have no disagreement with this recommendation.

2. California State University and Colleges

Interdepartmental coordination is well underway at the four State Colleges with Agriculture programs. New options in Agriculture are subject to all-college review and approval as well as review and comment by the Coordinating Council and review and approval by the Chancellor's Office. One State College has initiated major curricular revisions which include interdepartmental course and program developments.

3. California Community Colleges

This examination is currently in progress. Community College educational programs are approved by the Chancellor, local curriculum committees are extremely active in this regard, and Community College presidents, deans of instruction, and local occupational advisory committees contribute to the close scrutiny of all new programs. A responsibility of the Community Colleges is to respond as well as possible to the needs of the local community within the framework of available resources.

B. COUNCIL STAFF COMMENTS

Segmental policies indicate positive action on this recommendation. Under the current agreement with the public segments of higher the general term Educational Reserve may be used) are:

1. An area to be used exclusively for research, although a few other non-consumptive uses may be allowed in some cases. Suggested name: Research Reserve

2. An area for general field instruction, in which limited joint use or use-sharing is allowable. These areas may under certain conditions be made available to high schools, elementary schools, museum classes, etc.[1] Suggested name: Instructional Reserve

3. An area to be used not primarily for its intrinsic ecological value but as a base for technological education (boat docks, warehouses, mariculture, ponds, etc.). These can often, perhaps generally, be located in areas which are themselves not in the above two categories, especially not in pristine or near-pristine natural areas. Maricultural areas should not impinge on undisturbed areas, but may be nearby, as they require water of good quality. (Particular descriptive titles such as Mariculture Reserves, Technological Base, Applied Research Area, etc. should be used.)

There are three levels of instructional and research use to which sites may be put: (a) observations and measurements only; (b) collecting and selective sampling; and (c) manipulative use, both pure and applied. Those three levels are applicable to any three of the types of functional areas listed above.

C. Cooperative Use

Higher Education must work closely with certain agencies of government, especially the State Departments of Parks and Recreation and Fish and Game. Many of the research areas needed by higher education are in existing or proposed State Park system units; sections of these units should be set aside as Research and Instructional Reserves. The "State education, proposals to initiate new options in agriculture would come to the Council for review and comment. Council staff presumes that these proposals would stress cooperative efforts with other instructional units.

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[1] It should be emphasized here that educational institutions other than those representing higher education have needs for marine educational reserves and, in fact, their uncontrolled use of many coastal areas constitutes a serious problem. Planning should be instituted to provide areas for their use.

RECOMMENDATION 6

Excessive Course Offerings

Thoughtful curricular reform is definitely needed.

A. SEGMENTAL RESPONSES

1. University of California

We agree that curriculum review and revision is a continuing responsibility. In the University, the recent major reorganization of instruction in agricultural sciences at Davis, the consolidation of instruction in biology and agriculture at Riverside in a single Department of Biological and Agricultural Sciences, and the reorganization of the undergraduate programs in agricultural sciences now in process at Berkeley reflect this commitment in the University. (The policy directive on this subject which was issued by Vice President McCorkle on June 9, 1971, is attached.) (See Appendix C.)

2. California State University and Colleges

As pointed out in previous statements, curricular performance reviews are conducted by all State Colleges. Elimination of course proliferation is an important consideration in the review process, and course duplication is studied carefully by the colleges. Instances of a single faculty member teaching "as many as twelve to fifteen different courses covering a wide range of disciplines" do not occur in the State Colleges. Such a practice is not in the best interest of students, and instances of this type of scheduling should be stopped wherever found.

3. California Community Colleges

There is a constant need to review curricula in all areas. Advisory committees on agriculture programs assist Community Colleges regularly in the process of curricular review.

B. COUNCIL STAFF COMMENTS

The underlying concern of this recommendation has not received sufficient attention in the past. Segmental curricular review, although adequate, has not always led to reform. It is the implementation of reform that concerned the consultant. Council staff persists in this recommendation, believing that interdisciplinary faculty committees should be used extensively by segmental staff in carrying out the recommendation. Currently it is common to find descriptions of courses in agriculture quite similar to descriptions of those offered in biology, business, economics, engineering, home economics, industrial arts and technology, and mathematics. If the courses are, in fact, quite similar, perhaps slight modifications of the courses in other departments might make them suitable for use by agriculture departments.

With respect to the Community Colleges, the study found that on some campuses far too many options were offered for the few faculty members available to teach the wide range of subject matter involved.

RECOMMENDATION 7

Credit for Judging Courses

> *It is recommended that courses in judging livestock and other agricultural commodities be discontinued as credit offerings.*

A. SEGMENTAL RESPONSES

1. University of California

Not applicable to the University of California. We offer no judging courses for credit.

2. California State University and Colleges

The State Colleges believe that judging livestock should be retained as an essential part of Agriculture education. There appears generally to be no problem with including judging as part of a course offering. In some instances it appears justified to offer this as a separate course, since the experience gained is an important part of student training in certain Agriculture major areas.

3. California Community Colleges

Such courses should be discontinued unless behavioral objectives are established and met.

B. COUNCIL STAFF COMMENTS

This recommendation was directed primarily to three of the four California State University and Colleges that offer agriculture. Council staff agrees with the consultant that although judging experience is valuable it should either be incorporated into other courses or treated as an extracurricular activity. Today's agriculture student has many more sophisticated demands placed upon him during the course of his program than before. Technical skills, labor-management relation skills, and business skills are receiving much greater emphasis in the industry today. Some curricular reforms must be made.

RECOMMENDATION 8

Work Projects: Supervision and Credit

No more than four semester (or six quarter) hours in "supervised work projects" should be allowed for credit toward the Associate of Arts degree or for transfer. No more than eight semester hours in this type of endeavor should be applicable to graduation requirements for the baccalaureate degree.

A. SEGMENTAL RESPONSES

1. University of California

The University concurs in the philosophy expressed here and endorses the concept of properly supervised work experience within reasonable limitations. The Agricultural and Natural Resources Liaison Committee is considering this question and it is anticipated that the Committee will recommend a maximum of six quarter units which can be expected to receive serious consideration by the University.

2. California State University and Colleges

The State Colleges see no problem with this recommendation. At the present time the question of the number of credit units for "supervised work projects" is under study by the Articulation Liaison Committee on Agriculture and Natural Resources. The State Colleges will follow the recommendation of the Committee if the recommendation is accepted by the Administrative Committee of the Articulation Conference.

3. California Community Colleges

The Administrative Code provides for work experience education in the Community Colleges, and this is an important thrust in occupational agriculture programs in California. Over 1,000 students are enrolled for credit at agriculture work experience education training stations. It is possible to earn 16 semester hours of credit toward the AA degree. The recommended limitation should apply to transfer only.

B. COUNCIL STAFF COMMENTS

Title V of the Education Code allows up to 16 units of credit in work experience for a vocational program in the Community Colleges.

The consultant's recommendation refers to credit acceptable for transfer to a four-year program. Council staff believes that transfer credit allowed for work experience should be limited to approximately 4 semester units or their equivalent.

Work experience, properly supervised, and with student and job properly matched, is a valuable part of an educational program. Work experience provides the student an opportunity for self-evaluation and an opportunity to place theory, basic skills and knowledge, and practice in juxtaposition.

Inasmuch as this question is currently being studied by the segments (through the vehicle of the Liaison Committee on Agriculture and Natural Resources) Council staff recommends that the Liaison Committee report on the matter at the May 1973 meeting of the Administrative Committee of the Articulation Conference. While Council staff recommends an upper limit of 4 semester units in work experience, it has no objection if the three public segments agree to a maximum of six.

Council staff noted that many students in the Community Colleges interviewed during the course of the study were generally dissatisfied with present work experience because of lack of supervision and because the experiences were not designed to provide a variety of activity.

RECOMMENDATION 9

Berkeley: Undergraduate Program

The undergraduate program in agriculture at Berkeley should be retained despite low enrollments in many of the separate majors.

A. SEGMENTAL RESPONSES

1. University of California

The faculty of the College of Agricultural Sciences at Berkeley, in consultation with the School of Forestry, is in the midst of a major reorganization. The new program is planned to include a substantial redirection of undergraduate instruction through which the existing undergraduate curricula will be reduced to three and the emphasis will be brought more strongly on the sciences underlying agricultural production, processing and marketing and their application to the management and conservation of natural resources and the control of adverse effects on the natural and domestic environment. In this new plan the present major in "Agricultural Science" will be abandoned. Undergraduate enrollments are increasing in response to initial steps in the reorganization plan -- from 203 in the Fall of 1969 to 549 in the Fall of 1971.

2. California State University and Colleges

Although this recommendation applies directly to the University of California, the State Colleges believe that the undergraduate program in Agriculture at both the State Colleges and the University of California should be subject to review using the same criteria for both.

3. California Community Colleges

No comments at this time.

B. COUNCIL STAFF COMMENTS

Council staff concurs with the actions taken and proposed by the University and with the comments of the State University and Colleges. The Berkeley faculty and administration is to be commended for revitalizing the curriculum. When this reorganization plan is developed, the University should submit the plan to Council staff for review and comment if it falls under the definition of a new program.

RECOMMENDATION 10

Berkeley: Agricultural Science Option

Instead of being a single basic "agricultural science" major, the Agricultural Science option is, in fact, an "umbrella" title under which several majors are offered. Despite the fact that it effectively hides the limited numbers of students in the separate disciplines, it remains a low-enrollment, high-cost program. Since the great majority of the graduates of this option continue on to graduate school, the present degree of flexibility is not essential. In concept, the program is good and it can be justified as a means of producing potential graduate students. Only the degree of specialization is questioned and it is understood that this problem is currently under study. Other departments that have retained their separate majors would do well to reduce their requirements for upper division work in their departments and join in the agricultural science option to the mutual benefit of all.

A. SEGMENTAL RESPONSES

1. University of California

See comments on Recommendation 9. Initially the option was undertaken in part as an administrative device to encourage the phasing out of some of the low enrollment highly specialized undergraduate majors, as well as to provide a broader base in the agricultural sciences. If the current reorganization plan is adopted, one major agricultural science curriculum will emerge to replace the presently fragmented program.

2. California State University and Colleges

Although recommendation 10 applies directly to the University of California, the State Colleges believe that the undergraduate program in Agriculture at both the State Colleges and the University of California should be subject to review using the same criteria for both.

3. California Community Colleges

No comments at this time.

B. COUNCIL STAFF COMMENTS

Proposed changes at Berkeley will conform to this recommendation. (See comments under Recommendation 9.)

RECOMMENDATION 11

Riverside: College of Biological and Agricultural Sciences in Concept and Practice

The concept of a College of Biological and Agricultural Sciences is most exciting and offers an ideal means of welding the talents and interests of the basic and applied scientists on a broader front than has been attempted before. It does not, and should not, mean that the biologists become slaves to agriculture or limit their interests to areas of immediate concern to agriculture. Hopefully, the biologists will be sensitive to the needs of agriculture and the agriculturalists will be able to see the long-range value of "pure" biology. There should be an increasing amount of communication and collaboration. For the good of both biology and agriculture nationwide it is hoped that this happy wedding will be given maximum opportunity to succeed.

A. SEGMENTAL RESPONSES

1. University of California

As does Dr. Gries, we see much promise in the reorganization of instruction in biology and agriculture at Riverside and agree that this concept should be given every opportunity to prove itself.

2. California State University and Colleges

Although recommendation 11 applies directly to the University of California, the State Colleges believe that the undergraduate program in Agriculture at both the State Colleges and the University of California should be subject to review using the same criteria for both.

3. California Community Colleges

No comments at this time.

B. COUNCIL STAFF COMMENTS

Council staff concurs with this recommendation and with the segmental responses.

RECOMMENDATION 12

Riverside: Animal Science

> *The College of Biological and Agricultural Sciences on the Riverside Campus of the University should not initiate a full-scale program in Animal Science unless there is a major change in manpower needs of the industry.*

A. SEGMENTAL RESPONSES

1. University of California

There is no intention at present to initiate a full scale program in animal science at the Riverside campus. We are not sure that we understand the implications of the concluding statement under this recommendation that there is a need for greater research "because of the unique problem of the livestock industry in southern California". The University's Agricultural Experiment Station is constantly alert to such needs.

2. California State University and Colleges

An Animal Science program is already a part of the program at California State Polytechnic College, Pomona, and provides a good potential for the implementation of inter-institutional cooperation. The college is prepared to discuss the means by which a cooperative program can be developed. Faculty, courses and livestock research facilities could be made available for the support of undergraduate and graduate programs. The Southern California area adjacent to Cal Poly, Pomona facilities is one of the most concentrated dairy and poultry producing areas in the United States. The needs of the area's economy enhances the desirability for such an inter-institutional agreement as suggested.

3. California Community Colleges

No comments at this time.

B. COUNCIL STAFF COMMENTS

Council staff concurs with the consultant's recommendation and urges University staff to consult and cooperate with State University and College staff in any consideration of an animal science program at the Riverside campus. In later correspondence the University reiterated that it "... has absolutely no intention of offering programs in animal science except at Davis." In the event an animal science program is proposed for the Riverside campus, the University would normally submit the plan to the Council for review and comment in accordance with the agreed upon role of the Council in academic planning.

RECOMMENDATION 13

State Colleges: Mission and Emphases

The State Colleges as a group should define more precisely their mission and their role in the total higher education hierarchy within the State.

A. SEGMENTAL RESPONSES

1. University of California

No comment, since this recommendation applies to State College programs.

2. California State University and Colleges

One concept which is important in understanding the mission and the role of the State Colleges in "the total higher education hierarchy within the State" is that each college is not and cannot be all things to all people. Trustee policy on academic master plans precludes this. The differences among the colleges are important to the proper functioning of the system in the service of the State. Some program duplication is necessary to meet the needs of the students and the surrounding communities as assessed by the college. The purpose of Agriculture education is to provide personnel to meet the employment needs in the agricultural industry of the State of California and to maintain a contemporary stance vis-a-vis changes in the industry. Consequently, each program must maintain its flexibility, through creative utilization of faculty and facilities on each campus. The student must be educated in such a way that he can anticipate and manage technological changes in the industry.

3. California Community Colleges

No comments at this time.

B. COUNCIL STAFF COMMENTS

Council staff concurs with this recommendation. The Office of the Chancellor is currently reviewing all academic programs, including agriculture.

RECOMMENDATION 14

State Colleges: Lower Division Programs

It would be highly desirable if the State Colleges, in concert, could agree on a two-year core program in agriculture, a stronger two-year program in the basic sciences and general education component, and retain a minimal number of electives that may be needed to motivate some students.

A. SEGMENTAL RESPONSES

1. University of California

No comment, since this recommendation applies to State College programs.

2. California State University and Colleges

At the present time the Articulation Liaison Committee for Agriculture and Natural Resources is working to develop a lower division program which is comparable throughout the state but is not identical at all institutions. If successful, the program will allow each of the institutions of higher education to retain its individuality, yet allow for the smooth transfer of agriculture students from the Community Colleges into the State Colleges or the University upper division programs. As for the general education component, more than one of the Articulation Committees have recommended strongly that the General Education-Breadth component be spread over the four-year program rather than being concentrated at the lower division. This would also allow more units to be devoted to lower division basic sciences, as recommended in the study.

The question of lower division motivational courses has been discussed with industrial representatives. Based on industrial studies, it seems true that many potentially excellent students are lost to the Agriculture industry because of a lack of early exposure to such courses.

3. California Community Colleges

If the State Colleges develop a two-year core program, it should be done in cooperation with Community Colleges to prevent articulation problems.

B. COUNCIL STAFF COMMENTS

The comments of the State University and Colleges indicate willingness to conform to this recommendation through the Liaison Committee on Agriculture and Natural Resources. The Liaison Committee should report its progress in developing the core curriculum to the Administrative Committee of the Articulation Conference at its May 1973 meeting. Recently proposed changes in State University and College regulations concerning Community College transfer students state that only those courses which are designated as "transfer" courses will be used to determine eligibility for transfer. These regulations are to take effect in the Fall of 1973. While it would be convenient to "standardize" the lower division programs of the State University and Colleges, the diversity that exists between the California Polytechnic Colleges and the other State Colleges will present some difficult problems if a student is redirected. State University and College and Community College staffs are now directing their attention to this matter with the hope of resolving the problems a redirected student might encounter before the regulations become effective. The Community Colleges hold the position that their potential transfer students should be allowed to complete as many units in agriculture as do lower division "native" students in the State Colleges. Under conditions of redirection the lack of uniformity, while preserving individuality on each campus, can place a severe hardship on a transfer student.

RECOMMENDATION 15

State Colleges: Technical Agriculture Program

The Office of the Chancellor should initiate an analysis of the sub-baccalaureate technical agricultural program at California State Polytechnic College, San Luis Obispo. This analysis should determine the need for the program in view of the increasing number of technical programs in the Community Colleges and its influence on the baccalaureate program.

A. SEGMENTAL RESPONSES

1. University of California

No comment, since this recommendation applies to State College programs.

2. California State University and Colleges

The Chancellor's Office submitted an analysis to the Coordinating Council for Higher Education on this two-year Technical Agriculture Program on April 3, 1970. California State Polytechnic Colleges, San Luis Obispo is aware of the problem concerning the sub-baccalaureate Technical Agriculture Program. One Community College in the service area has initiated an Agriculture program, and a second Community College is investigating the area needs. The college will seek proper program coordination with the two Community Colleges, including facilities and program sharing where possible.

3. California Community Colleges

The Community Colleges agree with this recommendation which is similar to a previous Council study recommendation.

B. COUNCIL STAFF COMMENTS

The technical program at California State Polytechnic College, San Luis Obispo, is unique and outstanding. The program serves not only the local area but also the entire State.

The consultant and Council staff have expressed their concern to Cal Poly about the relationship between the College's technical agriculture program and its degree program. Many of the students in the technical program do not appear to meet the regular admission requirements of the State University and Colleges. Yet, many of the courses offered in agriculture at Cal Poly are taken concurrently by students seeking a baccalaureate degree and by students enrolled in a technical agriculture program.

The concern of the consultant and Council staff is that this sharing of courses between the two programs may lead to a loss in quality in the baccalaureate program. It appears that some courses require prerequisites of the baccalaureate student which the technical agriculture student would not meet.

The latest published listing of Community College occupational programs[1] shows that Allan Hancock College, which is within commuting distance of the Cal Poly campus, has initiated twelve different options within agriculture. Council staff also understands that Cuesta College, located in San Luis Obispo, is contemplating some activity in agriculture.

While it is unusual to plan Community College programs around an existing State College program, Council staff believes that, in view of the fact that Cal Poly has some of the finest agriculture facilities in the State and that the institution has a long-standing history of providing a technical program as well as a baccalaureate program, a definite need for additional programs in the geographic area should be clearly demonstrated before any consideration is given to establishment or expansion of Community College programs in the region.

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[1] Office of the Chancellor, Occupational Programs in California Public Community Colleges 1971-72, California Community Colleges, Sacramento, California, p. 10.

This geographic region provides an ideal opportunity to explore fully the joint use of facilities.

RECOMMENDATION 16

State Colleges: Acceptance of Transfer Students

> *It is strongly recommended that, by joint action, the State Colleges sharply restrict the work for which they will give transfer credit toward the baccalaureate degree to a level no greater than that permitted of their own "native" students. Recommended is a maximum of 18 semester hours (or equivalent) of courses in agriculture, including not over four units for "supervised work" activities. Until a mechanism can be devised using some features of "programmed" instruction which will allow students to build upon the base which they have in an area, credit should not be allowed for courses taught without the prerequisite that the comparable course has at the State College.*

A. SEGMENTAL RESPONSES

1. University of California

No comment, since this recommendation applies to State College programs.

2. California State University and Colleges

New Title 5 regulations governing the State College acceptance of transfer units from the Community Colleges have recently been adopted, which should resolve issues of transferability of Community College work. The State Colleges recommend that a maximum of 20 semester units (or the equivalent) of courses in Agriculture be accepted in transfer toward minimum degree requirements, provided that all of these courses are preceded by prerequisites comparable to State College courses. The colleges also recommend that a maximum of 4 units of "supervised work" be accepted for transfer toward minimum degree requirements, in addition to the 20, making possible the transfer of a maximum of 24 semester units (or equivalent) of agricultural courses.

3. California Community Colleges

Continuing review of this character is conducted in respect to transfer credit. The National Science Foundation Agricultural Sciences Articulation Project (Cal Poly, San Luis Obispo) is examining issues of such Community College transferable credit, and completion of this project should be taken into consideration.

B. COUNCIL STAFF COMMENTS

Council staff concurs with the Board of Trustees' action regarding this recommendation, with the exception that further consideration should be given to placement of work experience credit within the 20-semester unit maximum of acceptable transfer credit.

The new State University and College regulations on transfer students, which becomes effective in 1973, will need to take into account the variations in lower division requirements among the various agriculture programs and the possibility of redirection. Under the new regulations, the transfer student will be allowed and encouraged to take the same lower division courses for transfer as are required in the programs for "native" students.

RECOMMENDATION 17

State Colleges: Master's Degree Programs

- *The master's degree programs offered by the State Colleges have not yet achieved sufficient stature that their long-term potential is evident. The Office of the Chancellor for the State Colleges should undertake a critical examination of them with particular regard to need and quality. Those that have genuine potential should be supported; those lacking it should be discontinued.*

A. SEGMENTAL RESPONSES

1. University of California

No comment, since this recommendation applies to State College programs.

2. California State University and Colleges

Master's degree programs in Agriculture are relatively new in the California State Colleges. The performance review previously referred to provides a means of evaluating all degree programs in quantitative and qualitative terms. The ongoing review procedures will meet this recommendation, with which the system is in total agreement.

3. California Community Colleges

No comments at this time.

B. COUNCIL STAFF COMMENTS

Segmental policies already conform to this recommendation. Master's degree programs in the State University and Colleges exist at Fresno, Chico, and San Luis Obispo. Cal Poly, Pomona, anticipates initiating a master's program in animal science in 1972.

While it is true that master's degree programs in agriculture are relatively new in the State University and Colleges, enrollments in the various programs have not increased substantially since they began. In particular, the need for the master's degree program at Chico should be re-examined.

RECOMMENDATION 18

Individually Prescribed Instruction Techniques

The use of the "process approach" or Individually Prescribed Instruction (IPI) techniques should be carefully examined as an improved method of enabling the smooth transition of transfer credit.

A. SEGMENTAL RESPONSES

1. University of California

We assume that this approach to the transfer credit problem will be included in considerations by the Agricultural and Natural Resources Liaison Committee of the Articulation Conference.

2. California State University and Colleges

The "Individually Prescribed Instruction" techniques recommended in the study have been a part of all State College programs under provisions for challenge examinations. Explorations of credit-by-examination and external degree opportunities, now vigorously underway in the State Colleges, may also provide means by which some students can complete portions of a degree program through methods which satisfy the concept of Individually Prescribed Instruction techniques.

3. California Community Colleges

The use of the "process approach" or Individually Prescribed Instruction (IPI) techniques should indeed be examined carefully as a method for enabling the accelerated progress through a program of study.

B. COUNCIL STAFF COMMENTS

Segmental responses indicate a willingness to explore the proposal for Individually Prescribed Instruction. There are significant possibilities and problems involved in describing course performance objectives and in defining measurable levels of student performance in meeting these objectives. There are also unknown educational and financial ramifications to this proposal for evaluation of experiences and the prescribing of needed additional experiences. Council staff commends the segments for their intention to explore the many issues raised by this recommendation.

RECOMMENDATION 19

Community Colleges: New Programs

Guidelines should be established immediately under which new programs in agriculture may be permitted at institutions not now offering agriculture. New programs should be justified on the basis of actual needs of the local and regional industry. Data should be accumulated and presented not only on the agricultural skills needed, but also on the desired proficiency in mathematics, communication skills, social and psychological characteristics, and understanding of civil government. New programs should be encouraged to contain a stronger "general education" component than most existing ones. No new programs in agricultural welding, agricultural business, etc., should be initiated without careful analysis of possible collaboration with other programs in the college.

A. SEGMENTAL RESPONSES

1. University of California

No comment, since this recommendation pertains to Community College programs.

2. California State University and Colleges

The State Colleges concur in the recommendation and are available to assist in any way through studies, advice, and interinstitutional facilities utilization.

3. California Community Colleges

These activities are now taking place. Local Community College trustees, presidents, deans of instruction, deans of vocational education, directors of agriculture, and agriculture advisory committees are addressing themselves to the activities in this recommendation.

The Board of Governors of the California Community Colleges has determined that general education requirements in the Community Colleges will consist of the following minimum requirements: 15 semester units of general education which must include at least one course in each of four areas: (1) natural sciences, (2) social sciences, (3) humanities, and (4) learning skills. The Board of Governors and the Community Colleges are very active in newly-established vocational area planning committees and are also developing area master plans for vocational education. These area master plans will be useful to Community Colleges within the same general geographic area. These planning areas are formed along major job market areas.

B. COUNCIL STAFF COMMENTS

Since the study of agricultural programs was undertaken, the Council as assumed its new role in the review of academic plans and programs. This recommendation is inherent in the review process for proposed new programs.

RECOMMENDATION 20

Potential Transfer Students: Identification and Treatment

It is imperative that advisors of students in the Community Colleges make every effort to identify potential transfer students early in their academic career. Such students should be encouraged to broaden their backgrounds with courses in the social sciences and humanities as well as in the basic sciences. Formal courses in agriculture should be kept to a minimum.

A. SEGMENTAL RESPONSES

1. University of California

No comment, since this recommendation pertains to Community College programs.

2. California State University and Colleges

A recurring problem is the number of vocational-technical students who decide to enter a baccalaureate program. Early identification of these students will eliminate many obstacles which they face when attempting to enroll in and complete a 4-year program. Each of the State Colleges works closely with Community College counselors to assist in developing methods of identifying potential transfer students, and will continue to do so. Experience shows that one way to identify these students is through the early introduction of the student into "motivational" types of courses.

3. California Community Colleges

The problem is realistic assessment of goals and objectives by students. Some students indicate they may wish to transfer, but in practice, many do not. Recent regulations adopted by the Board of Governors require course work in the social sciences, humanities, and other areas of general education.

B. COUNCIL STAFF COMMENTS

The newly adopted regulations of the Community Colleges and the new transfer policy of the State University and Colleges will alleviate this problem in time.

RECOMMENDATION 21

Community Colleges: Short Courses

It is suggested that the Community Colleges, individually and in concert, explore the potential needs and methods of staffing increased activities in the area of short courses particularly designed to fit the needs of the industry.

A. SEGMENTAL RESPONSES

1. University of California

No comment, since this recommendation pertains to Community College programs.

2. California State University and Colleges

There is a great need for such short courses. The State Colleges will cooperate with the Community Colleges in the development of such courses, and the possible provision of expanded offerings leading to external degrees which can satisfy the needs of the agricultural professions. This also will entail the development of guidelines for joint use of facilities.

3. California Community Colleges

The Board of Governors is examining alternatives to present financial restrictions which do not permit appropriate use of short courses.

B. COUNCIL STAFF COMMENTS

Council staff concurs with this recommendation and commends both the Board of Governors for examining viable alternatives, and the Board of Trustees for their willingness to work cooperatively with the Community Colleges in this endeavor.

RECOMMENDATION 22

Agricultural Education

> *A thorough analysis should be made by representatives of all State Colleges and University campuses offering agriculture (whether they have agricultural education programs or not) of the impact of the attempt by some programs to integrate the courses required for certification throughout the undergraduate years as well as the "fifth year."*

A. SEGMENTAL RESPONSES

1. University of California

The only agricultural education program within the University system exists at the Davis campus. Enrollment is comprised largely of transfer students in certificate programs. We are unclear as to what the nature of the problems referred to in this recommendation are since we have experienced little difficulty. We would, of course, be happy to participate in the proposed analysis.

2. California State University and Colleges

The State Colleges agree that there must be an evaluation of the Agriculture Education programs, but pending development of guidelines by the new Commission for Teacher Preparation and Licensing, no specific action should be taken. At the present time the credential programs in Agriculture are being administered by the Bureau of Agricultural Education, which will be working closely with the Commission. It is hoped that planning will continue and, when a need can be demonstrated, new programs can be developed with the assumption that they will be accepted as "approved programs" by the Commission. Certainly no program will suffer from additional discipline support, but the types of support will be dependent upon the specific organizational pattern of the individual State Colleges.

3. California Community Colleges

No comments at this time.

B. COUNCIL STAFF COMMENTS

Council staff concurs with this recommendation and encourages the segments to provide information and advice to the Commission for Teacher Preparation and Licensing for the development of guidelines by which to evaluate agricultural education programs.

RECOMMENDATION 23

Accountability of Farm Operations

A uniform cost-accounting system for the operation of farms should be established by the Office of the Chancellor or the President for each of the systems of public higher education.

A. SEGMENTAL RESPONSES

1. University of California

It is assumed that this recommendation is not intended to be applicable since the University operates no "teaching farms" and its instructional programs are not burdened with such costs. Instructional use is sometimes made of Experiment Station Laboratory facilities, but the added costs of such instructional use to the Experiment Station are virtually negligible and would not yield to a meaningful accounting determination of magnitude. The report does not seem to take account of such relationships between teaching departments and the Experiment Station in its references to the costing of agricultural instruction.

2. California State University and Colleges

A uniform cost-accounting system for the operation of the State College farms would be of great value and steps will be taken to work directly with the Office of Business Affairs in the Chancellor's Office in order to develop a uniform system.

3. California Community Colleges

The Board of Governors is developing a cost-accounting system that will implement this recommendation.

B. COUNCIL STAFF COMMENTS

Council staff urges the Board of Trustees of the State University of Colleges and the Board of Governors of the Community Colleges to work cooperatively to develop a compatable cost accounting system for the operation of farms.

RECOMMENDATION 24

Natural Resources Curricula

It is recommended that institutions proceed slowly in the development of full-scale programs in the "Natural Resources" areas. A few specialized courses and "short courses" could probably serve a useful purpose on an interim basis.

A. SEGMENTAL RESPONSES

1. University of California

We are unsure as to how to interpret the caution expressed in the Gries report in regard to the development of "full-scale programs" in natural resources. We agree that the expansion of programs in the resources area should be deliberate and with awareness of the potential for the employment of graduates. But we should also recognize this field as one of growing societal concern with respect to which the University has uniquely valuable research and educational capabilities. The University should therefore continue to support its research and degree programs in forestry (professional, MS, and Ph.D.), and should be alert to ways in which to enhance the contributions to be made by its schools of forestry and agricultural sciences to resource development and conservation and to control of the environmental impact of agricultural production activities.

2. California State University and Colleges

In the event that there is a demonstrated need for programs in the Natural Resources area in the future, the State Colleges hope that this recommendation will not preclude the further development of such programs. The study recognizes that there is more to the Natural Resources area than just Agriculture, but it does not recognize that there are State College programs in Natural Resources at Colleges where Agriculture programs do not exist.

3. California Community Colleges

Community Colleges agree with this recommendation.

B. COUNCIL STAFF COMMENTS

The consultant intended the word "slowly" to imply caution. Adequate analysis of the need for graduates of programs in natural resources should be demonstrated prior to authorizing such programs. Council staff concurs with this recommendation.

The official classification of Natural Resources lies outside the academic "core" area for the public segments; therefore, any new proposed program in natural resources should come to the Council for review and comment. With adequate consultation with the segments, it is hoped that these programs can be distributed geographically and among the segments in response to need.

RECOMMENDATION 25

Veterinary Medicine

In view of the strong fundamental biology and new medical college associated with the Irvine campus, it is recommended that serious consideration be given to developing a second School of Veterinary Medicine on that campus.

A. SEGMENTAL RESPONSES

1. University of California

We agree that there will probably be a need for a veterinary education program to be located on a University of California campus in southern California at some time in the future. However, the specific campus and nature of the program, i.e., whether independent or coordinated with the School of Veterinary Medicine at U.C. Davis, would best be decided in light of the realities of funding and programs in progress at such time as the school would be established. It is our intent to continue studies so that the veterinary education program in southern California may be of the highest possible quality and relevant to the needs of the people of that region and the state at the time of establishment. In the meantime, the School of Veterinary Medicine at Davis will continue to work with the University of California at Irvine in an attempt to fulfill some of the needs for veterinary education in southern California on an interim basis. Also, in the meantime, it would appear that the most immediate and cost-effective way for us to increase the output of veterinarians would be to expand the school at Davis to its maximum capacity as soon as possible.

2. California State University and Colleges

Additional veterinarian training facilities are needed in the State of California. It would seem appropriate to locate such facilities so that new livestock facilities would not need to be developed. California State Polytechnic College, Pomona has land and animal facilities which could be used if a Veterinary Medicine college were located in the southern California region, with the result of a substantial savings to the State. The college has a strong pre-veterinary program and would like to discuss the possibility of a joint program with either University of California, Irvine or University of California, Riverside in order to make maximum use of facilities now existing.

3. California Community Colleges

No comments at this time.

B. COUNCIL STAFF COMMENTS

Council staff concurs with the recommendation of the consultant only on the assumption that "serious consideration" of one alternative does not preclude equally serious consideration of other viable alternatives, including consideration not only of University campuses, but also of intersegmental cooperation.

At the time this study was begun, there was a great deal of discussion about the University's initiating an additional Veterinary Medicine program to be located in southern California. From his study, the constultant found that the Riverside, Irvine, and San Diego campuses of the University were each considering the development of a school fo Veterinary Medicine.

The consultant was not asked to determine whether there is a need for additional graduates in veterinary medicine in California. Instead, he was asked to examine these three possible sites in terms of which offered the best environment for a new School of Veterinary Medicine in the event the University could demonstrate that a second school was necessary.

The University had undertaken a study of the need for a new school of veterinary medicine, but the results of this study were not available to the consultant. The consultant's conclusions regarding the location of a new program in veterinary medicine points to the fact that Irvine, with a School of Medicine and relationships with Irvine Ranch and the surrounding community, appears to offer the best opportunity and the greatest cost-benefits for a program in southern California.

The consultant's report does not take into account the effect of the expansion of the School of Veterinary Medicine at the Davis campus, which may be accomplished through the forthcoming health science bond issue. It may be that increased enrollments at Davis will adequately serve California's need for graduates in veterinary medicine.

Appendix A

ARTICULATION CONFERENCE•LIAISON COMMITTEE ON AGRICULTURE

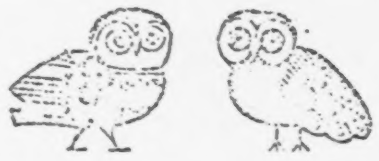
THE AGRICULTURAL EDUCATION STUDY HAS FOUND THE FOLLOWING:

EMPLOYERS SAID:

1. Obtaining qualified employees is their number one problem. The need to retrain their present employees is the second most serious personnel problem.
2. Few firms have their own in-service education programs and practically none use public educational institutions to upgrade present employees.
3. Few firms look to public educational institutions as a source of qualified employees nor do they rate them highly as a source of technical information.
4. Academic preparation in labor-business management is becoming increasingly essential for employees.
5. There will be increasing need for agricultural employees in the future, particularly in the skilled and professional job areas.
6. The most difficult jobs to fill and the jobs for which there will be the greatest future demand are the equipment operation, maintenance, and repair jobs.
7. Jobs for which the demand will increase are in equipment operation and repair, landscape and nursery work, management and supervision, sales, and food processing.

EMPLOYEES SAID:

1. Prior work experience was essential to obtaining their present job: on-the-job experience is a prerequisite to upward job mobility.
2. Upward job mobility is very limited in agriculture.
3. The most common job function performed by all job titles is that of supervising the work of others followed closely by the function of resource management.
4. Crop production and ornamental horticulture are the two most frequently needed areas of production knowledge.
5. Of the agricultural competencies needed, mechanical skills were most needed, then knowledge of plant science and skill in handling agricultural materials.
6. Animal production knowledge was essential to only a small percentage of employers.



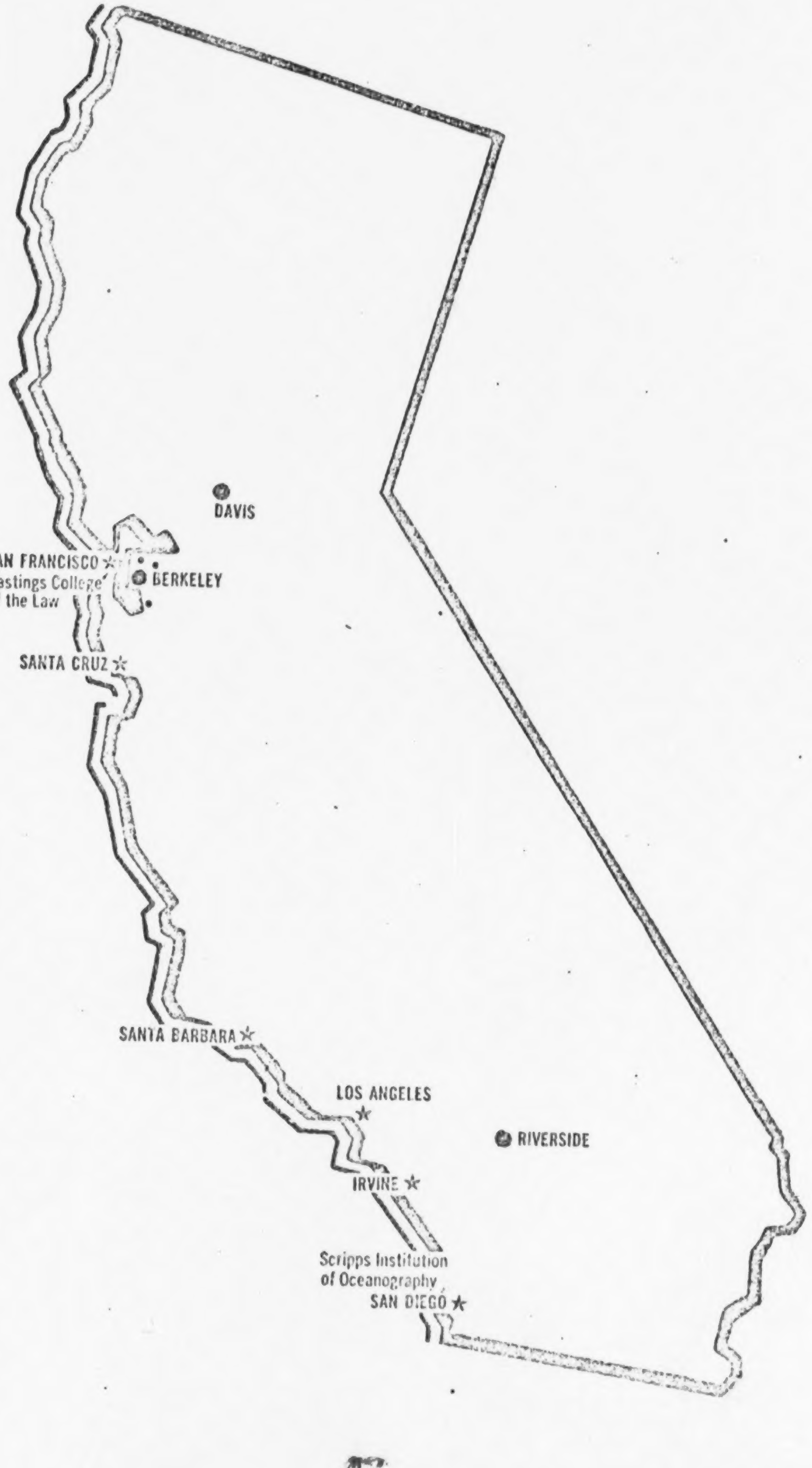
IMPLICATIONS:

1. Future need for agriculturally competent employees will increase; anticipated decreased need for unskilled laborers will be more than offset by increased need for personnel in skilled and professional jobs.
2. Communications must improve between educational institutions and agri-industry regarding personnel needs and qualifications.
3. There is need for added effort by employers and educators to more precisely describe job titles and more clearly define their individual functions and activities.
4. Job experience should be a required part of most job preparation programs in agriculture.
5. Agricultural mechanics programs must be strengthened, particularly at the high-school and community-college levels.
6. Community and four-year colleges must improve curricular offerings in labor-business management.
7. Most training programs for agricultural technicians should be at the community-college level.
8. State colleges and the university will play major roles in the preparation of owner/operators and managers of agri-industry.

APPENDIX B

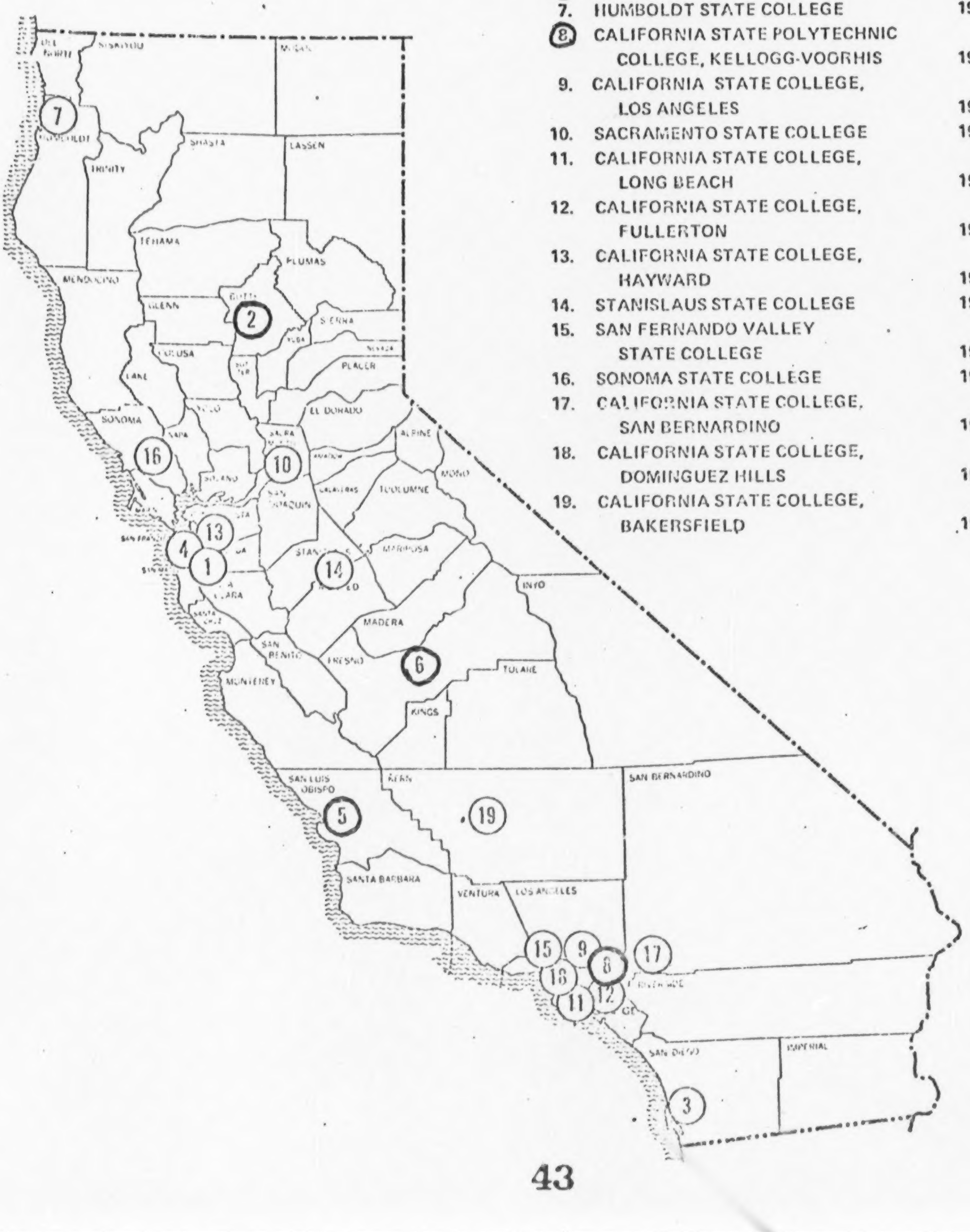
Maps Showing Location
of
Agricultural Programs
in the
University of California
California State University and Colleges
California Community Colleges

CAMPUSES OF THE UNIVERSITY

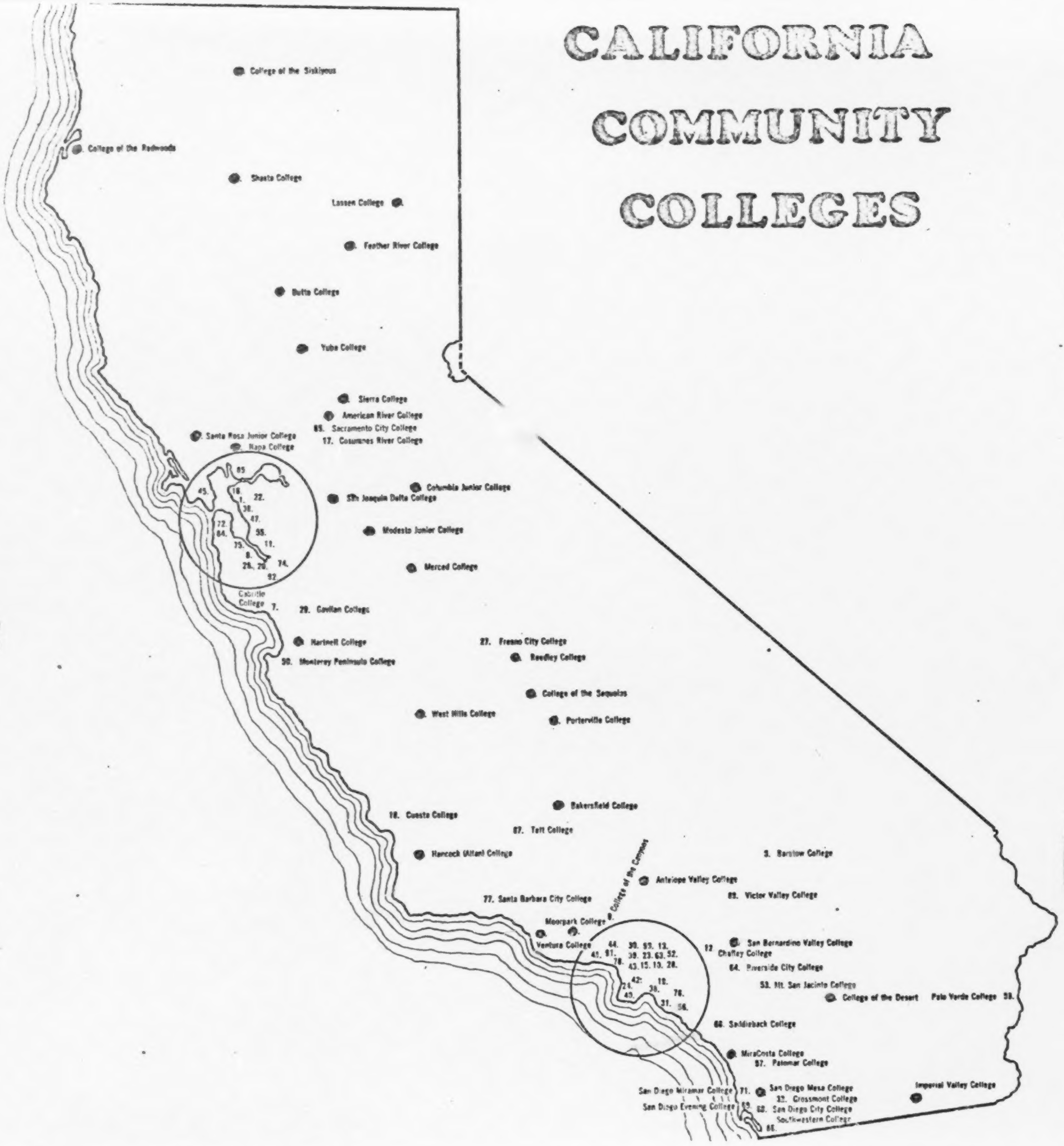

DAVIS
SAN FRANCISCO
Hastings College of the Law
BERKELEY
SANTA CRUZ
SANTA BARBARA
LOS ANGELES
RIVERSIDE
IRVINE
Scripps Institution of Oceanography
SAN DIEGO

THE CALIFORNIA STATE COLLEGES

CHRONOLOGICAL ORDER AND NAME OF COLLEGE		*DATE ESTABLISHED*
1.	SAN JOSE STATE COLLEGE	1857
②	CHICO STATE COLLEGE	1887
3.	SAN DIEGO STATE COLLEGE	1897
4.	SAN FRANCISCO STATE COLLEGE	1899
⑤	CALIFORNIA STATE POLYTECHNIC COLLEGE, SAN LUIS OBISPO	1901
⑥	FRESNO STATE COLLEGE	1911
7.	HUMBOLDT STATE COLLEGE	1913
⑧	CALIFORNIA STATE POLYTECHNIC COLLEGE, KELLOGG-VOORHIS	1938
9.	CALIFORNIA STATE COLLEGE, LOS ANGELES	1947
10.	SACRAMENTO STATE COLLEGE	1947
11.	CALIFORNIA STATE COLLEGE, LONG BEACH	1949
12.	CALIFORNIA STATE COLLEGE, FULLERTON	1957
13.	CALIFORNIA STATE COLLEGE, HAYWARD	1957
14.	STANISLAUS STATE COLLEGE	1957
15.	SAN FERNANDO VALLEY STATE COLLEGE	1958
16.	SONOMA STATE COLLEGE	1960
17.	CALIFORNIA STATE COLLEGE, SAN BERNARDINO	1960
18.	CALIFORNIA STATE COLLEGE, DOMINGUEZ HILLS	1960
19.	CALIFORNIA STATE COLLEGE, BAKERSFIELD	1965


DEL NORTE
SISKIYOU
MODOC
7
HUMBOLDT
SHASTA
LASSEN
TRINITY
TEHAMA
PLUMAS
MENDOCINO
GLENN
2
SIERRA
COLUSA
PLACER
LAKE
EL DORADO
SONOMA
NAPA
16
10
ALPINE
SOLANO
MONO
SAN JOAQUIN
TUOLUMNE
13
4
1
MARIPOSA
14
INYO
MADERA
SANTA CRUZ
SAN BENITO
FRESNO
6
TULARE
MONTEREY
KINGS
SAN LUIS OBISPO
KERN
5
19
SAN BERNARDINO
SANTA BARBARA
VENTURA
LOS ANGELES
15
9
8
17
18
12
11
RIVERSIDE
SAN DIEGO
IMPERIAL
3

CALIFORNIA COMMUNITY COLLEGES


College of the Siskiyous
College of the Redwoods
Shasta College
Lassen College
Feather River College
Butte College
Yuba College
Sierra College
American River College
85. Sacramento City College
17. Cosumnes River College
Santa Rosa Junior College
Napa College
Columbia Junior College
San Joaquin Delta College
Modesto Junior College
Merced College
85
45.
16.
1.
22.
36.
47.
72.
84.
55.
75.
11.
8.
26., 20.
74.
92.
Cabrillo College 7.
29. Gavilan College
Hartnell College
50. Monterey Peninsula College
27. Fresno City College
Reedley College
College of the Sequoias
West Hills College
Porterville College
Bakersfield College
18. Cuesta College
87. Taft College
Hancock (Allan) College
77. Santa Barbara City College
College of the Canyons 9.
Antelope Valley College
Moorpark College
Ventura College
3. Barstow College
89. Victor Valley College
44.
41. 91.
78.
30. 59. 13.
39. 23. 63. 52.
43. 15. 10. 28.
24.
42.
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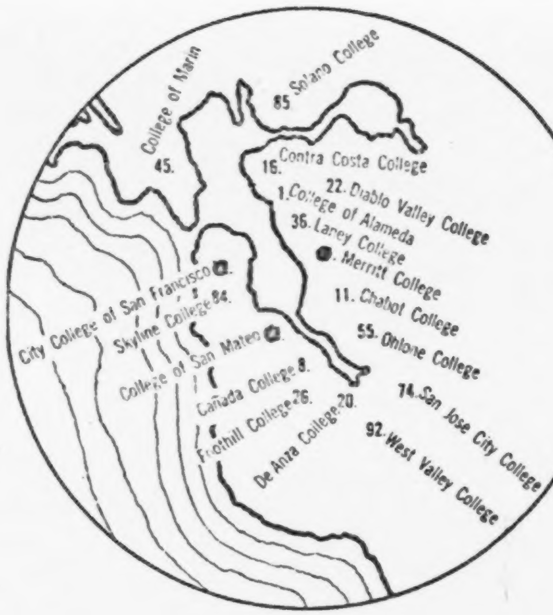
19.
38.
76.
31.
56.
San Bernardino Valley College
12 Chaffey College
64. Riverside City College
53. Mt. San Jacinto College
College of the Desert
Palo Verde College 59.
66. Saddleback College
MiraCosta College
57. Palomar College
San Diego Miramar College
San Diego Evening College
71.
69.
San Diego Mesa College
32. Grossmont College
60. San Diego City College
Southwestern College
86.
Imperial Valley College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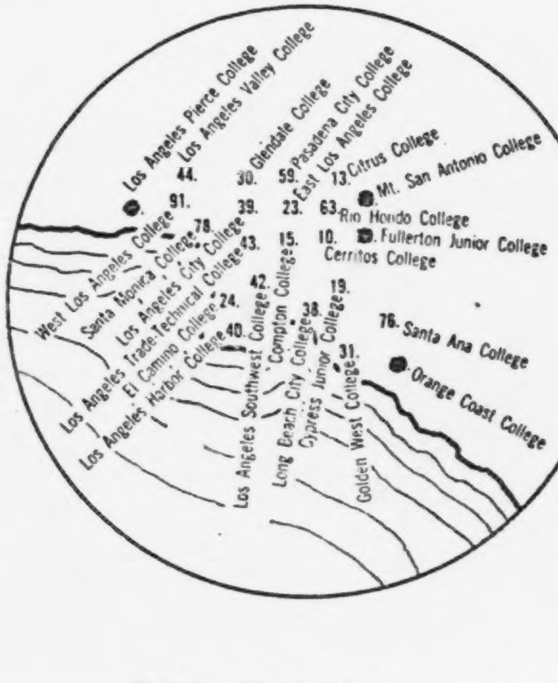
45.
85 Solano College
16. Contra Costa College
22. Diablo Valley College
1. College of Alameda
36. Laney College
Merritt College
11. Chabot College
55. Ohlone College
74. San Jose City College
92. West Valley College
City College of San Francisco
Skyline College 84.
College of San Mateo
Cañada College 8.
Foothill College 26.
De Anza College 20.

SAN FRANCISCO BAY AREA


Los Angeles Pierce College
Los Angeles Valley College
44.
91.
Glendale College
30.
59. Pasadena City College
East Los Angeles College
23.
13. Citrus College
Mt. San Antonio College
63. Rio Hondo College
10. Fullerton Junior College
Cerritos College
15.
39.
78.
West Los Angeles College
Santa Monica College
Los Angeles City College
43.
Los Angeles Trade-Technical College
42.
El Camino College
24.
Los Angeles Harbor College
40.
Los Angeles Southwest College
Compton College
Long Beach City College
38.
Cypress Junior College
19.
Golden West College
31.
76. Santa Ana College
Orange Coast College

LOS ANGELES AREA

APPENDIX C

June 9, 1971

Policy Directive from Vice President McCorkle

UNIVERSITY OF CALIFORNIA CHANCELLORS:

Re: Policy on Minimum Class Size.

Beginning in the Fall term 1971 I am asking that minimum class enrollment norms be established at each level of instruction, and that exceptions thereto be authorized only where the special justification clearly warrants the exception.

The minimum enrollment norms are set at: Lower Division (12), Upper Division (8), and Graduate Division (4). In the event that enrollment in a class falls below this specified norm in two successive offerings the class should be conducted again with an enrollment below the norm only with your approval or the approval of your designee(s). Less frequent offering of the class may eliminate the need for such special consideration, and this alternative should be kept in mind. You will recall my memorandum of November 9, 1970 in which I did express the view that there must be an opportunity for every freshman to participate during at least one quarter of the academic year in a small group class directly taught by a faculty member in one of the professorial ranks. This is to be viewed, of course, as one part of our continuing efforts to improve the quality of undergraduate teaching and to provide additional attention to students in the lower division. A class in which enrollment falls below the norm established above may be continued where necessary to achieve this purpose.

Additional criteria which might justify conducting a class below minimum size are suggested below. Department chairmen may of course cite other evidence for special justification which in your discretion you may take into account.

1. The course is required for graduation, and if the class were cancelled the date of graduation of students who wish to enroll in the course would be affected.

2. The course is required in a major program, and the class must be offered at a particular time in order to maintain proper sequence of courses.

3. The course (and/or the program of which it is a part) has been offered for only a short time, and has not yet developed to its full potential.

4. The course is of an experimental character, either in its subject matter or in its mode of teaching, or both, and time is needed to assess its potentialities.

5. The need for special facilities (laboratory, studio, etc.) limits the size of the class.

6. The need for close personal supervision of the students by the instructor limits the size of the class (e.g., certain types of fine arts instruction, clinical teaching, etc.).

7. The course is an offering in a subject field which does not attract a large student clientele, but which nevertheless should be represented among the scholarly offerings of a major university because of its importance to scholarship.

I would hope that in your office or perhaps in the offices of the Deans of the several schools and colleges a record might be maintained of the classes falling below the norms which have been conducted as a consequence of approval of the special justifications cited in their behalf.

We shall need to review the general policy set forth in this letter from time to time and I invite you to call to my attention any special problems which emerge. I feel strongly, however, that in the interest of an allocation of resources which will optimize the educational quality of the University we must give continual attention to the problem of class size. I ask your cooperation.

C. O. McCorkle, Jr.

cc: President Hitch
Vice President Johnson
Vice President Kidner
Vice President McGuire
Vice President Taylor

#447

COORDINATING COUNCIL
FOR HIGHER EDUCATION

Resolution Adopting Recommendations on Agricultural Programs in California Public Higher Education

WHEREAS, The Coordinating Council has received and discussed Agricultural Programs in California Public Higher Education, the report of its consultant, Dean George A. Gries; now, therefore, be it

RESOLVED, That the Coordinating Council commend Dr. Gries for his study of agricultural programs in California higher education and adopt the attached recommendations regarding agricultural programs in California institutions of higher education, which by reference become a part of this resolution.

Adopted
April 4, 1972

Governing Boards of the Public Segments

The Council advises The Board of Governors of the California Community Colleges; The Board of Trustees of the California State University and Colleges; and The Board of Regents of the University of California.

1. All proposed and existing programs, options, and courses in agriculture should be screened by appropriate academic officers to determine if collaborative interdisciplinary action is desirable and feasible on a campus.

2. The intersegmental committee, which was appointed to follow up on the report "Facility Sharing Among Institutions of Higher Education in California," in conjunction with the established mechanism of the Liaison Committee on Agriculture and Natural Resources of the Articulation Conference, should provide information about the joint use of facilities in agriculture and be responsive to suggestions and proposals resulting from the work of that Committee. The Committee on Facilities Sharing has already been asked to report to the Council on its findings no later than 1 June 1972.

3. Curricular review should be made on each campus to determine the existence of excessive degree-major programs, options, and courses in agriculture. Where unwarranted duplication or inadequate student support is found, curricular restructuring should be encouraged.

4. The segments in cooperation with the Articulation Conference Liaison Committee on Agriculture and Natural Resources, should develop guidelines and proposals for evaluating supervised work experience credit for transfer students. It is suggested that an upper limit ranging from 4 to 6 semester units of credit for work experience education should be acceptable for transfer. The Liaison Committee should report its findings at the May 1973 meeting of the Administrative Committee of the Articulation Conference.

5. The transfer student should be allowed to transfer the same amount of lower division credit in agriculture that is equivalent in content to that required of "native" students. The segments, working through the Liaison Committee on Agriculture and Natural Resources, should clearly define equivalent transferrable courses and stipulate upper limits on the number of units of credit in agriculture transferrable to individual four-year campuses. With respect to the State University and Colleges, the proposed change in transfer requirements to be implemented in 1973 should be taken clearly into account, including the possibility of redirection. This report should also be submitted to the Administrative Committee of the Articulation Conference in May 1973.

6. Examination should be made of techniques for the evaluation of prior study and experience of a student relative to satisfying the course requirements of an institution. Based upon such evaluation, opportunities should be provided for the student to acquire the additional experience needed to achieve full course credit.

7. The use of the "process approach" or Individually Prescribed Instruction (IPI) techniques should be carefully examined as an improved method of enabling the smooth transition of transfer credit.

8. It is recommended that institutions proceed with caution in the development of full-scale programs in the "Natural Resources" areas. A few specialized courses and "short courses" could probably serve a useful purpose on an interim basis.

Board of Governors and Board of Trustees

The Council advises The Board of Governors of the California Community Colleges and The Board of Trustees of the California University and State Colleges:

1. The Community Colleges and the State University and Colleges should cooperatively develop an intersegmentally compatible cost-accounting system for student operations conducted on college farms.

Board of Governors

The Council advises The Board of Governors of the California Community Colleges:

1. Courses in judging livestock and other agricultural commodities should be either discontinued or restricted as credit offerings in transfer programs.

2. Renewed effort should be made to distinguish vocational students from potential transfer students, and to provide appropriate academic counselling. The vocational education function of the California Community Colleges is of vital importance to California. It is important that the California Community Colleges carry on both vocational and transfer programs in agriculture.

3. Guidelines should be established immediately to govern the establishment of new programs. New programs should be justified on the basis of actual needs of the local and regional industry. New programs should be encouraged to contain a stronger "general education" component than most existing ones. No new programs in

agricultural welding, agricultural business, and other programs of a similar nature, should be initiated without careful analysis of possible collaboration with programs in other departments in the college; for example, welding, business, auto mechanics, etc.

4. Those students intending to transfer to a baccalaureate degree program should be counseled to obtain a broad background in the basic sciences as well as in the social sciences and humanities.

5. The feasibility of offering "short courses" by individual colleges, or by several colleges cooperatively, regardless of segment, should be examined.

6. The colleges should be encouraged to consider giving greater emphasis in their programs to courses in labor management and business management.

7. The Community Colleges within commuting range of California Polytechnic College, San Luis Obispo, should reexamine the need for establishing new, high-cost agricultural programs that parallel the technical agriculture program offered by California State Polytechnic College, San Luis Obispo.

Board of Trustees

The Council advises The Board of Trustees of the California State University and Colleges:

1. Courses in judging livestock and other agricultural commodities should be discontinued or restricted as credit offerings.

2. No additional campuses should be authorized to establish new degree programs in agriculture at this time.

3. The State University and Colleges as a group should define more precisely their mission and their role in the total higher education heirarchy within the State.

4. The sub-baccalaureate technical agricultural program at California State Polytechnic College, San Luis Obispo, should be continued. However, the influence of the technical agricultural program on the baccalaureate program should be examined closely to determine if the technical agricultural program tends to reduce the quality of the baccalaureate program.

5. The current review of existing and proposed graduate degree programs and options by the Office of the Chancellor, in cooperation with campus faculty and administration, is encouraged and commended by the Council. The status of graduate programs in agriculture needs clarification. Those that have genuine potential should be supported; those lacking it should be discontinued.

6. Schools or departments of agriculture and of education should be encouraged to develop mutually acceptable "fifth year" programs leading to teacher certification that permit students to complete requirements within minimum credit guidelines being established by the Commission for Teacher Preparation and Licensing, the State's certification agency.

Board of Regents

The Council advises The Board of Regents of the University of California:

1. No additional campuses should be authorized to establish new degree programs in agriculture.

2. The undergraduate program in agriculture at Berkeley should be retained.

3. The Council commends and encourages the current evaluation and reorganization within the College of Agricultural Sciences at Berkeley, with the assumption that the current fragmentation of curricula will be resolved.

4. The concept of a College of Biological and Agricultural Sciences at the Riverside campus is most exciting and offers an ideal means of welding the talents and interests of the basic and applied scientists on a broader front than has been attempted before. There should be an increasing amount of communication and collaboration and the experiment should be given maximum opportunity to succeed.

5. In the event an additional school of veterinary medicine is considered for southern California, discussions should be held with the staff of the Chancellor of the State University and Colleges and with private institutions to determine the feasibility of intersegmental cooperation. The proposal for such a program should identify clearly the need for the program and its relationship to the capacity of the existing program at the Davis campus of the University.

xxxx

CHAPTER I

HIGHER EDUCATION IN AGRICULTURE

A. HISTORICAL OVERVIEW

From the time man assumed the responsibility of caring for his family, the arts of husbandry of plants and animals must have been part of his oral tradition. Pictographs from the era when man lived a nomadic life record his concern with the methods of hunting and the use of fruits and berries. The value of crops and animals as food and the techniques of their culture are among the topics discussed at length by the scholars of early civilizations -- Chinese, Egyptian, Roman, and Greek.

Although the history of formal educational programs is vague, we do know that topics related to agricultural production and processing were included along with other aspects of natural science in the education of clerics, doctors, and "gentlemen" in medieval times and became recognized as a specific discipline in certain British schools at least by the early eighteenth century. University training programs in agriculture and forestry were highly developed in Germany by the middle of the following century and served as the forerunner of higher education programs in this country.

In the United States, the establishment in the latter half of the nineteenth century of the land-grant, or "A&M", colleges either as a part of, or separate from, the state universities changed the popular conception of higher education. Previously, the classics and certain elements of abstract science, language, and literature -- thought to be the proper training for the professions of law, medicine, and religion -- constituted the basic curriculum. In the land-grant colleges, the practical arts, including agriculture, were emphasized. Following the passage of the Hatch Act in 1878 and the Smith-Lever Act in 1914, research and extension in agriculture also became associated with the land-grant college's activities.

Early in this century, many states required at least one course in agriculture of the region for certification of primary and secondary school teachers; thus, agriculturalists were employed on the faculties of many of the normal schools. Although increasing urbanization resulted in the elimination of these certification requirements, many of the former normal schools retained their agricultural programs even as these institutions grew into state colleges and state universities.

In many sections of the United States, regional agricultural high schools were organized during the first quarter of this century to supply the need for training future farmers in the latest skills in agriculture. Commonly, these institutions added two years of college work. Many ultimately dropped their secondary school programs to remain as two-or, in some instances, four-year institutions with some emphasis on agriculture.

Despite these few other types of institutions, the land-grant college continued to dominate the scene in higher education in agriculture for several decades and, in fact, still does in many states. Their evolution has not been entirely uniform, however, nor has it been without bitter argument and division.

As long as the land-grant institution was the sole agency responsible for training agriculturalists, it assumed the responsibility for the entire spectrum of programs needed -- from the short course through one-and two-year technical programs, the four-year baccalaureate degree programs, and on to the highly sophisticated programs in graduate-level work in the basic agricultural sciences. Unlike the "mechanic arts," which bifurcated to distinguish between engineers and technologists, agriculture remained a closely knit family. A continuum of training was provided all within one institution. No division was recognized by the attainment of professional degrees and no effort was made to distinguish the "scientist" from the "artisan" or the practitioner. This sense of "one big happy family" of agriculturalists was at once both its genius and one of its own worst enemies. While it made agriculture a solid political force in a governmental system dominated by the rural portion of the population, it worked to the disadvantage of the overall image of agriculture and especially that of the agricultural scientist.

The land-grant institution, with the tradition of servicing all of agriculture and with the political advantage gained thereby, was reluctant to give up the less-academic applied aspects of the discipline to the other four-year and two-year institutions that could assume these functions. With time, however, most such institutions have withdrawn (although not always gracefully) from the training of technicians and have concentrated on the preparation of scientists and specialists to fill the needs of industry, government, and their own teaching, research, and extension functions.

The development of two-year colleges with a high measure of local autonomy added a new dimension that greatly hastened the relinquishment of the short courses and technician training courses by the universities. In California and a few other states (notably Missouri), the State College system is another force that served to hasten the evolution of higher education in agriculture.

B. PRESENT STATUS OF AGRICULTURAL PROGRAMS IN CALIFORNIA

Higher education in agriculture is very much in a state of evolution. This is in response to a number of factors: the changing manpower needs attending changes in the industry; the redefinition of "agriculture;" a concerted effort by some to change the "image" of agriculture; the demand of citizens to make a variety of training experiences available to all; and the jockeying among institutions for programs and students.

The goals of the agricultural efforts of each of the three types of institutions of higher education in California are fairly well defined, and it is easy to point to the sucess of graduates of the University and the State Colleges and of those completing a program in the Community Colleges to indicate that they are doing an effective job. Without question, each element of the system of higher education is training its students to find a niche in the manpower needs of the State and/or nation. In so doing they are satisfying, to some degree, the needs of the industry. There is no doubt, however, that each can do better. Great improvement can come about from a redefinition of goals and more harmonious interaction between the institutions.

1. Summary of Instructional Programs in Agriculture

Dr. O. J. Burger[1] conducted a survey of institutions offering work in agriculture in California and summarized the information on programs current in 1970 as follows:

	Total No.	No. w/Agric. Programs
High Schools	1,477	277
Community Colleges	93	37
State Colleges	19	4
University campuses	9	3

The agricultural programs in high schools and Community Colleges are distributed by region as shown below:

	High Schools	Community Colleges
North Coast	24	6
South Coast	31	1
Superior	42	7
Central	43	4
San Joaquin Valley	45	5
Southern	39	6
Southwestern	53	8

In recent years there has been a rapid expansion in the number of Community College programs. Many of these have been broadly based general programs, but an increasing number have been limited to one or two specialties (e.g., ornamental horticulture, nursery management). The most significant development in the secondary schools has been the growth in size of the individual department. This, in part, relates to the consolidation of school districts but also reflects increases in enrollment.

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1. O. J. Burger. "Progress and Status of Articulation between Two and Four-Year Institutions in California." NACTA Jour. 14(3): 43-44. 1970.

2. The University of California

Although each of the three campuses of the University of California which offer programs in agriculture is distinct in its approach to the field, all have, in common, the preparation of the highly motivated and able student for the more scholarly pursuits. Even at the bachelor's-degree level, those who graduate have strong theoretical backgrounds. Few could step into a job without in-service training in current skills and practices. Berkeley emphasizes the training of research scientists in the relatively classical fields of agricultural sciences. Davis has redefined agriculture and broadened the definition to include the total environment and family and community services. Riverside has emphasized plant biology.

As a whole, the University receives very few transfers from the agricultural programs in the two-year Community Colleges or even from the State Colleges. Most of the University students either matriculate as freshmen on a University campus or take a standard academic course in a Community College prior to transfer.

3. The California State Colleges

The primary mission of the State Colleges is to place students in the agricultural industry at the baccalaureate level. Secondarily, they prepare students for advanced study. They emphasize occupationally oriented education with a minimum basic background, much of which is covered within the regular academic courses in agriculture. The maintenance of standards is made somewhat more difficult because of strong competition among these institutions for transfers from

Community Colleges. In many cases, they have given credit for work in the two-year institutions, even though there was real doubt as to whether it was of the calibre that should have been allowed for baccalaureate-degree credit. The freedom with which agricultural courses are transferred from Community Colleges tends to make all of the State Colleges operate "upside-down" programs because of the excessive number of applied units transfer students bring with them.

4. The California Community Colleges

The Community Colleges of California, without question, have the most complex and difficult mission to perform of all of the types of institutions of higher education. They are charged with the dual responsibility of training technicians in one-and two-year programs and preparing students for transfer to four-year institutions. The large majority of students in two-year agricultural programs are not seeking the baccalaureate degree. Generally, these programs are highly successful in training technicians for immediate employment in industry, although one can question whether or not they are actually serving the students' long-term interests as well as they might. They are less successful in preparing students for transfer to the State Colleges and, for all intents and purposes, do not encourage top students to enter the University. Primary attention in the current study was given to the Associate of Arts and other two-year programs. The one-year (Certificate) curricula are generally sound and, although they service the majority of the Community College students, they were considered primarily as they influenced the progress of potential transfer students.

5. Interinstitutional Communication

California has led the nation in recognizing the interdependence of educational institutions -- both at the same "level" and among those in the several systems. The field of agriculture has a series of statewide committees at the high school, Community College, State College, and University levels that stimulate and coordinate interchange of information on matters of common concern. The following committees have been operative since 1944:

a. Affiliations Committee (high school -- since 1919)

b. Junior College Committee on Relations with Other Schools (since 1932)

c. State College Committee on Coordination

d. University Committee on Affiliations with Secondary Schools, Junior College Conference Committee, and Committee on Coordination of State Colleges

e. Liaison Committee on Agriculture and Natural Resources of the Articulation Conference

CHAPTER II

COST OF INSTRUCTION IN AGRICULTURE

The unit cost of agricultural instruction is high. This characteristic is not unique to any one type of institution or to California alone, but prevails in nearly all institutions in the country. This derives primarily from two features of the discipline: (1) the need for expensive specialized facilities, and (2) the relatively low student-faculty ratio that exists.

A. FACILITIES

It is apparent that the cost of farms (especially in or near urban areas), farm equipment, specialized laboratories, and many other kinds of facilities is high. However, there is practically no information that relates this to cost of instruction on a per-student-credit-hour or other meaningful basis. In many cases, especially in the University, the same facilities, herds, and equipment are used in research and extension activities as well as in teaching. In many institutions, particularly the State and Community Colleges, some of the equipment, and even the land and livestock, may be held, in part or in whole, by a semi-autonomous "agricultural foundation," which runs part or all of the operation on a modified commercial basis, or through subcontracts with students who carry out projects for both a percentage of the profit and degree credit. Whether run by a "foundation" or through the business office of the institution, there is usually a revolving fund that enables purchases and returns money from sales for continued operation and further expansion. Gifts of land, equipment, animals, etc., also confuse the picture. On many campuses, much of the capital equipment is held on a short-term-lease arrangement with the manufacturer.

It is questionable whether any institution uses sufficiently refined methods of cost accounting to allow the prorating of capital investment expenses to instruction in a significant way. Such data would be highly illuminating and are desirable.

B. STUDENT-FACULTY RATIO

Agricultural instruction is characterized by a highly favorable student-faculty ratio in nearly all institutions relative to most other disciplines. This can be shown by any of several related statistics that one elects to use -- student credit hours (SCH) produced by each full-time-equivalent (FTE) faculty member, FTE student/FTE faculty, or average class size.

The following data from Oklahoma State University for the 1969-70 academic year illustrate that the phenomenon is not unique to California institutions:

Oklahoma State University

Student Credit Hours Generated per
Full-Time-Equivalent Faculty
Academic Year, 1969-70

	SCH/FTE Faculty	
Agriculture	585.50	
Arts and Sciences	989.12	
Biological Science		950.00
Chemistry		792.00
Sociology		1,364.08
Business	974.44	
Economics		1,021.15
Education	799.46	
Engineering	508.86	
Home Economics	513.38	

Especially significant is the relatively low unit production of SCH in agriculture in contrast to that in the "basic" laboratory science courses and in the various courses in business.

The following summary derived from raw data supplied by Chico State College further indicates the favorable student-faculty ratio of instructional programs in agriculture. There is no reason to suspect that this is not typical of the University and Community Colleges as well as the State Colleges.

Chico State College

Ratio of Full-Time Equivalent Students to
Number of Faculty Positions
Fall Semester, 1969

Discipline	FTE Students/FTE Faculty
Sociology	32
Geography	24
Economics	22
Mathematics	19
English	18
Mass Communications	18
Business	17
Education	16
Art	16
Home Economics	16
Computer Science	14
Biological Sciences	13
Chemistry	13
Engineering	12
Music	11
Agriculture	9
Industry and Technology	9
Nursing	5

Again, the favorable position of instructional programs in agriculture is evident, not only in comparison to their "basic" counterparts in the laboratory sciences and economics, but also in relation to art and music, in which much of the instruction is done on an individual basis. The favorable ratio held by nursing relates in major degree to rigid student-faculty ratio requirements for professional accreditation of nursing programs.

Class size is another criterion of cost of instruction. Obviously, the smaller the class size the higher the salary component of cost. The following information derived from a study conducted by the Coordinating Council for Higher Education is illuminating in that it focuses on the extremely high percentage of the total number of classes offered in the various California institutions that draw limited enrollments.

Agricultural and Natural Resource Programs

Undergraduate Courses with Low Enrollments
Fall Term, 1969

	Total Courses Taught	Less than 10 Enrolled	Less than 15 Enrolled	Less than 20 Enrolled
University				
Berkeley	40	25.9%	45.0%	67.5%
Davis	105	18.1	30.5	58.1
Riverside	17	41.2	100.0	100.0
State Colleges				
Chico	48	20.8%	43.8%	64.6%
Fresno	116	15.5	37.1	62.1
Pomona	102	25.5	43.1	70.6
SLO	270	12.2	27.0	46.6
Community Colleges	(Selected from those offering 11 or more courses)			
Bakersfield	20	10.0%	25.0%	40.0%
Butte	18	11.1	16.7	22.2
Fullerton	17	11.8	35.3	58.8
Modesto	93	9.7	26.9	58.1
Mt. SAC	47	14.9	21.3	44.7
Reedley	19	10.5	21.1	31.6
S.F. City	41	48.8	58.5	78.0
Sequoia	49	30.1	55.1	63.6
Shasta	26	15.4	23.1	26.9
Sierra	23	4.3	21.7	39.1
Ventura	35	34.8	40.0	54.3
Yuba	11	54.5	54.5	63.6

Agricultural and Natural Resource Programs

Graduate Courses with Low Enrollments
Fall Term, 1969

	Total Courses Taught	Less than 5 Enrolled	Less than 10 Enrolled
University			
Berkeley	17	17.7%	88.2%
Davis	35	11.4	54.3
Riverside	22	45.5	72.7
State Colleges			
Fresno	9	11.1	33.3

C. ANALYSIS OF REASONS FOR LOW STUDENT-FACULTY RATIO

Having established that there is a relatively low level of production of student credit hours per full-time equivalent faculty member in agricultural programs, attention can be focused on the reasons for this feature, whether or not it is justifiable, and what steps could be taken to reduce costs of instruction by adjusting this factor.

1. Agriculture is not a discipline in the sense usually used in the academic world. The college or department of agriculture concerns itself with those facets of all disciplines that bear on the problems and concerns of an entire industry. Since courses in agriculture are commonly taught with the "problem-solving" approach, the instructors draw from all disciplines to develop, analyze, and solve the problem at hand. The content of a course is usually restricted to a small segment of the industry (e.g., swine nutrition, breeding of horticultural crops, fitting and showing of dairy cattle). Much time is devoted in each course to

teaching background concepts that often duplicate those given in other courses. Because many students are either uncertain of the area in which they wish to specialize or are attempting to obtain a broad background in all of agriculture, they are required or elect to take more courses in their major than do students in other disciplines.

2. Most faculty members become relatively highly specialized during their advanced undergraduate or graduate experience in either an agricultural area (horticulture crops, poultry science, livestock marketing) or in a basic discipline such as genetics, animal physiology, and entomology. As a result of this specialization few feel they are prepared to teach broadly based courses or even courses in several agricultural areas. It has, thus, been the practice to employ one or more specialists in a number of areas (agricultural mechanics, ornamental horticulture, crop science, animal science, agricultural economics, etc.) to present the variety of courses deemed necessary. Proliferation of courses has also resulted from the desire of faculty members to offer highly specialized courses in their own area of preparation. This practice is not unique to instructors in agriculture, however.
3. Colleges and departments of agriculture have enjoyed a rather high degree of autonomy and this, coupled with their rather unique mission of approaching a theme rather than a discipline, has led them to duplicate the teaching of many fundamental skills and concepts that are taught elsewhere in the institution.

In some cases they have been forced into this situation by unsympathetic personnel in the basic departments; in others it has been the product, purely and simply, of "empire building." A few examples of the duplication built into institutions teaching agriculture are courses in "agricultural economics" and "agricultural business" that overlap with courses in "economics" and "business;" the teaching of courses in general horticulture that do not have botany (or biology) as a prerequisite (a survey of textbooks made in 1965 indicates that at least 40 percent of the subject matter in the horticulture texts is covered in botany or biology texts); and the teaching of such subjects as genetics and plant physiology under titles such as animal breeding and crop physiology. It is difficult to defend the teaching of such courses as "Spanish for Agricultural Workers," "Agricultural Mathematics," and "Report Writing" in departments of agriculture.

Much of this redundancy has been removed voluntarily at the University level. It persists in the State Colleges and Community Colleges. The most common justification given is the need to motivate the students to learn by showing them the usefulness of the subject matter in the study of agriculture. There also seems to be an undertone of fear that if a student should get interested in the discipline for its own sake he might forsake the study of agriculture.

4. Limited enrollments in agriculture contribute to small class size. Considering the numbers of faculty "specialists"

necessary to run a broadly based program in agriculture, and the need to keep these instructors fully engaged according to a State-dictated policy, an excessive number of courses may be offered for the size of the student body. One outgrowth of this combination of factors is that in some institutions very unhealthy competition -- both intramural and extramural -- has developed. On the one hand, students are encouraged to take additional courses in agriculture rather than to enroll in courses in "basic" or liberalizing disciplines. On the other hand, competition in recruiting for transfer students has resulted in general downgrading of the standards of individual courses and, consequently, the standards of the baccalaureate degree.

D. SUMMARY

Instructional costs in agriculture are high, resulting from a combination of expensive facilities and a low student-faculty ratio. Both are desirable from a pedagogic point of view, but whether they can be justified in every case depends on the priorities placed on the programs by the individual institution. Cost effectiveness can be increased without greatly lowering (and perhaps even improving) the quality of instruction.

Cooperation between local units can be encouraged but cannot be forced without statewide control. Some ways in which cooperative efforts between school districts could result in sizable reductions in cost are listed below:

1. Joint planning and financing of a strong program at one institution to service two or more adjacent school districts.
2. Planning to avoid excessive duplication of areas of specialization with free interchange of students between the districts.
3. Joint construction of specialized facilities at one institution to service an area of the State. Instruction could be carried out on a "short-course" basis for students from distant points.
4. Use of specialized facilities at Community Colleges, State Colleges, and the University campuses on a "short-course" or one-quarter-per-year basis.
5. Much of the expense attending small class size could be eliminated by imaginative curricular reform.

The cost of agricultural programs is greatly increased by the convenient but unessential duplication of effort between the division of agriculture and other divisions of the institution. While no one can dispute the convenience of the agricultural department having, for example, its own welding shop and courses in welding, there is insufficient justification (and enrollment) on most campuses to allow this luxury. Although regular welding courses usually deal with more techniques and materials than are essential to the agricultural technician, courses could be programmed that would satisfy the needs of both the agricultural student and those in auto repairing, etc. On some campuses this procedure is followed and apparently works well. Similarly, on a few campuses the agricultural business option is a joint venture between the department dealing with business administration and the agricultural department, but all too frequently agriculture attempts to run its own "business option," including courses in bookkeeping and accounting, market theory, etc.

There are reasons other than the saving of faculty time why the agricultural department should cooperate fully with other areas of the institution. Needless duplication in courses covering the same concepts merely so that one group of students may be "motivated" is an expensive luxury. Another factor relates to the mobility of employees as a group. Students with agricultural training frequently move out of the agricultural field into other business areas, and those trained in some other discipline frequently enter some aspect of the agricultural industry. The product of a well-conceived joint effort in training, for example, an "agribusiness man," should result in a much more flexible and versatile individual.

Only within the past few years in an effort to gain student credit hours have most departments of agriculture made any effort to contribute to the general education of the total student body of the institution of which they are a part. Many of these efforts have been made primarily to extoll the virtues of agriculture and hopefully, to, proselyte students from other disciplines into it. Colleges and departments of agriculture have a real challenge in presenting surveys of the agricultural industry to majors in business, engineering, the sciences, and other disciplines that would enable those students to fit more easily into the agricultural industry.

CHAPTER III

MANPOWER NEEDS

The success story of the American agricultural industry has often been told. In fact, it has been so successful that not many years ago agriculture was made the scapegoat for our national woes. Our farms and ranches were so efficient that major percentages of some commodities were stockpiling and going to waste. Unemployment was high because of the migration of farm youth to the city in greater numbers than could be absorbed by other industries. The public image of agriculture was low, but fortunately recent concern with the population explosion in this country and a more humanitarian approach to the world's needs has again focused the attention of the public on the importance of agriculture.

The most visible sign of the increased efficiency in agricultural production has been the decrease in number and the increase in size of the individual agricultural holding. The trend toward large family-owned farms and corporate holdings and the dramatic increases in technology have decreased the need for numbers of generalists but have increased the demand for specialists at all levels of employment. A modern farm manager is a businessman, knowledgeable about the various steps in his operation, but one who calls upon specialists in areas as diverse as tractor driving, accounting, and the controlling of pests to insure that his operation moves smoothly.

The rapid changes in production, processing, and marketing of agricultural commodities and in the services required by the various facets of the industry result from technological advances and create a genuine dilemma in forecasting manpower needs.

Until recently very few manpower projection studies have been useful in assisting colleges and departments of agriculture in anticipating the needs of the future and, hence, the planning of their curricula. This has stemmed largely from the variance in the definition of "agriculturalist" by those who conduct manpower studies and the administrators of educational programs in agriculture. To the average citizen, and certainly to those who have made manpower-need projections, agriculture has been synonymous with farming, and the logical assumption has followed that, since numbers of production units are decreasing by the consolidation of preexisting units and since technological advances have made it possible, at least in many jobs, for a single operator to greatly increase his productivity, the demand for trained "agriculturalists" should decline in a projectable fashion. The studies have almost entirely excluded consideration of those engaged in technical, scientific, service, or managerial activities, for whom formal training in agriculture is either indispensable or desirable.

Most of the projections of manpower needs prepared by agriculturalists have been equally misleading because of their tendency to think that all who need an appreciation and understanding of the agricultural industry to do their work most effectively must, therefore, require a two- or four-year program in agriculture. For many of the positions, a person well trained in business, management, or a standard skill with just a survey course or some practical experience in the field, might perform just as well as or better than an agricultural "graduate." Only in recent years in a few schools (and all too frequently motivated by an effort to gain student credit hours) have agricultural divisions attempted to present surveys of the industry designed for majors in business, engineering, the sciences, or other disciplines that would enable those students to fit more easily into the agricultural industry.

Certain facts do become apparent from most of the recent manpower need projections for agriculture (including the draft report of the study, Occupational Needs and Future Demands [in California], prepared by O. E. Thompson, G. F. Macleod, J. W. Becket, J. Halterman, and K. E. Irby. Of critical importance is the fact that there is and will continue to be a demand for persons with certain skills who have an appreciation and knowledge of certain aspects of agricultural enterprise. These include those with single or multiple skills, for which no formal post-secondary training is required, up to and including those with sophisticated research training. It is also apparent that techniques and demands change so rapidly that there must be procedures for the retraining of individuals at the technical level. It is presumed that those with substantial background in theory can adapt to these changes.

As agricultural practices evolve it is apparent that certain specialities become less in demand while others, perhaps new ones, assume greater importance. Changes in the livestock industry, for example, have created a situation in which fewer and fewer two-year and baccalaureate graduates are needed. Other fields such as equipment operation and maintenance and ornamental horticulture are requiring increasing numbers of technically trained personnel.

Many of the fields in which increasing numbers of qualified workers are needed do not require a full two-year program. The Community Colleges could fill a much-needed role by expanding their program of "short courses" to train or retrain personnel in such fields as fruit harvesting, irrigation, machinery operation, etc. Some two-year institutions are doing an excellent job in this area already, but even these could increase their offerings in short-courses in specific skills at no additional expense simply by reducing some of their obsolete traditional programs.

Several surveys have indicated a definite need for personnel at mid-management levels with an understanding of such fields as business management and labor relations. Some have lamented that offerings in these areas are few among the agricultural curricula in the two- and four-year institutions in the State. An analysis, however, suggests that such courses are nearly always available within the offerings of the department or college of business. The reluctance of many agriculturalists to utilize expertise elsewhere on the campus in the training of students is lamentable.

It is also apparent from a variety of published sources that movement into and out of agriculturally related businesses by upper- and mid-management personnel is rather common. Not only does this question the need for intensive work in the broad field of agriculture, since many who have little or no training in agriculture enter agribusiness occupations, but also whether agricultural graduates could not profit from a broader view of American business enterprises in general.

Numerous studies of desired characteristics of employees as seen by employers point to the great importance of communication skills, mathematical competence, and practical psychology as it relates to interpersonal relations. Other surveys indicate that employees, too, recognize their own deficiencies in these areas. This strongly suggests that the curricular requirements in agricultural programs have failed to prepare students adequately in these nonagricultural disciplines.

In summary, it can be suggested that the Community Colleges must be constantly alert to the specific needs of their local industries, both with respect to the content of regular programs and in the planning for and offering of programs to vocationally oriented students. It should prepare students to enter any of a group of closely related occupations in which job opportunities exist. The two-year and the four-year institution preparing graduates for mid-management positions should draw upon other resources of the campus to assist in training their students in business and management principles, improved communication skills, and fundamentals of labor relations, etc.

CHAPTER IV

PROGRAMS IN THE CALIFORNIA COMMUNITY COLLEGES

The Community Colleges have given yeoman service to the educational needs of the citizens of California and have brought the potential for continued learning within the reach of everyone. By virtue of a relatively high degree of local autonomy there are great variations among the Community Colleges with respect to scope and emphasis of program. Some serve primarily as "junior colleges" with major emphasis upon preparation of transfer students; others are basically "technical schools" stressing instruction in the skills essential for immediate employment. A number of the Community Colleges do an excellent job in both general education and vocational training. The following discussion deals with the two-year vocational and transfer programs and excludes the one-year certificate programs.

In many colleges the capacity of the institution for liberal education is seldom utilized in the agricultural curricula beyond the minimum requirements established at the State level for the Associate of Arts degree. Even this is frequently bypassed by students not in the associate program. In some colleges the agricultural faculty appear to be more closely geared to the immediate needs of the community for specialized manpower than to the need to improve the total long-range potential of their students. Using the reason that it is essential to motivate students by giving them vocationally oriented courses, they fail to direct their students into "general education" courses that might improve their capacity to better compete in industry and to contribute to society.

It is refreshing to find that, in some of the Community Colleges, most frequently those with rather restricted programs, a genuine effort is being made to prepare the better students for transfer to one of the State Colleges or to the University. The number of technical agricultural courses is kept to a minimum (in some cases only one per quarter) with the remainder of the work being carried in the basic sciences, the social sciences, and the humanities. These students are prepared for upper division work in agriculture in any institution in the country.

The limited participation in "general education" courses of students in agriculture and natural resources stems, in part, from the very close relationship that exists between the permissible numbers of teaching faculty and the student credit hours generated. Because agriculture embraces so many diverse specialties and because the four-year institutions create specialists -- plant scientists, animal scientists, mechanical artists, economists, natural resource management personnel, etc. -- it is impossible to offer a broad program in agriculture without several faculty members. But faculty positions are justified on the number of students and courses taught; therefore, there is a widespread tendency for each department to enroll as many of their own students as possible in each course. As a result the following problems are created:

1. Students are encouraged to register in almost every agricultural course available to the exclusion of courses in the social and behavioral sciences and the humanities that might make them more knowledgeable and sensitive citizens within the community.

2. Potential transfer students are not encouraged to register in courses in the basic sciences -- such as mathematics, chemistry, physics, biology -- and other disciplines. In most cases, these students must take these courses following transfer, a policy which contributes to the "upside-down" nature of the four-year institutions' programs.

3. Duplication and redundancy is created within the Community College itself. Whereas, the department of agriculture could join together with basic departments, (e.g., biology and chemistry) and applied departments (e.g., auto mechanics) in developing meaningful programs in agricultural science, agricultural business, or maintenance and repair of machinery, each goes its separate way. Agriculture, thus, teaches its own courses in such fields as entomology and soils, agricultural business management and salesmanship, welding, and repairs and maintenance of small engines.

   Clearly, much good could come from greater interdepartmental cooperation at the Community College level if it were not for the pressures of needing more student credit hours.

Although considerable lip service is given by the faculty of the Community Colleges to the early identification of potential transfer students and to guiding them into strong programs in the basic sciences and the social sciences, an examination of transcripts of students who had transferred to State Colleges, generally, belies the claim. It is not infrequent to find the transferring students may have from 40 to 48 of their 62 credit units required for the associate degree to have been in agricultural courses or in closely related technical areas.

Although there can be no question that the Community Colleges are sensitive to the needs of the local industry, there is question as to whether the industry itself is truly self-enlightened and whether the courses are of college transfer calibre. If industry really has its own and the community's long-term interest at heart, it will insist that the students receive a strong foundation in general education. Industry should prefer employees with better basic understandings and perhaps it could assume more of the responsibility for technical training through in-service programs than is presently the case.

As to the calibre of the subject matter taught, one cannot generalize. Where the student population is relatively homogeneous and the instructor is well prepared, there is little question that the work is rigorous, challenging, and of high quality. In other cases the coverage is minimal, geared to the most poorly prepared student and subject to question as to whether or not it is truly of college-level calibre. Several instructors either volunteered or admitted that their programs differ little from those they had attempted when they were teaching in secondary schools. The difference was that in the Community College they were able to carry out their programs, whereas, in high school problems of discipline and attitude prevented them from doing so.

A. FARMS AND FACILITIES

The theory of learning by doing is deeply inculcated into the average Community College instructor. This was what he had been taught while preparing for service in the secondary school, and it has been accepted as the best way for instructing in the two-year vocational programs. Certainly, no one can argue the validity of this instructional device, particilarly for teaching skills and certain problem-solving exercises. It also is an excellent device for motivating certain types of students. The excessive use of individual and class projects, "busy-work," and other such instructional activities, no doubt drives many of the academically highly capable students away from agricultural programs.

Well-operated farms, farm shops, and other facilities are excellent devices for motivating students, teaching them techniques and skills, and giving them a sense of responsibility. It is equally true that a poorly operated farm or shop or a poorly or improperly designed project has a negative educational value. Both types of operations prevail within the Community College system. Efforts have been made by several of the departments to substitute for or supplement the farm-project experience with a variety of internships, which if properly programmed with follow-up should be very effective.

The ownership of commercial-type installations by Community Colleges is expensive, not only from the standpoint of initial investment, but also from the standpoint of maintenance and improvement. Some schools claim to make money on their farms, at least enough to underwrite the cost of the student projects. In others, the student projects themselves are planned to return some profit to both the student and the department.

B. WORK PROJECTS

It is a very common practice in the Community Colleges to allow students to accumulate considerable credit (up to four units per semester) in "work project" activities. These vary a great deal and may constitute such activities as farming a small acreage (usually a single crop), fattening a pen of animals, or caring for a number of hens. The basic essence of the "work project" is that it must be carried out with proper managerial care and that strict fiscal and time accounting be done. Frequently, the institution will have some type of revolving fund established as a "bank" from which students may borrow funds to conduct the work. At the end of the term of the activity the student repays the revolving fund and splits the profit, if any, with it. In case the project loses money the revolving fund usually absorbs the loss, so that in no case does the student stand to lose funds.

There is little question that this type of work project, when properly administered and when not carried to extreme, is a highly valid learning experience. It can be, and is occasionally, abused. Some of the projects have little or no educational value and, in some cases, repetition is allowed in the area of a student's interest -- even in a field in which the student has had even more sophisticated experience at home or in the industry. Another abuse of the work-project activity is that, in some cases, it has been sufficiently time consuming to interfere with the student's class work; and, of course, the value of the experience has to be weighed against the potential long-term value of courses in other areas, such as accounting, local government, or even the humanities. The newly revised regulations governing "work-experience education" in Title V of the California Administrative Code should be valuable in standardizing and upgrading the educational value of these work-oriented projects.

C. RELATION OF PROGRAM TO FACULTY SIZE

Although it has been stated above that a solid broad coverage of agriculture requires a diversified faculty, there is no essential relationship between quality of program and number of faculty in a given institution. In general, those with large faculties do offer high quality work in a number of different options. At the same time, some of the most impressive programs in specialized areas, e.g., the program in ornamental horticulture at American River College and the program for veterinary technicians at Pierce College, are the responsibility of a single instructor. As in all educational enterprises, quality is most dependent upon the individual teacher and his rapport with students.

The range of sizes and breadth of programs is readily seen from the accompanying table on page IV-8.

The chart can be grossly misleading unless one takes into account that some low-enrollment programs are new and rapidly growing. Some others, however, are decreasing in size. The number of faculty listed is not entirely accurate since it may not reflect some part-time instructors and some vacancies.

COMMUNITY COLLEGES OFFERING PROGRAMS IN AGRICULTURE (WITH OR WITHOUT NATURAL RESOURCES) IN ORDER OF SIZE OF FACULTY[1]

COMMUNITY COLLEGE	NUMBER OF FACULTY	AVERAGE DAILY ATTENDANCE (ADA)	NUMBER OF OPTIONS IN		
			AGRICULTURE	ORNAMENTAL HORTICULTURE & LANDSCAPING	NATURAL RESOURCES
MODESTO	18	324.41	4	1	2
COLUMBIA	1	NA			
L.A. PIERCE	9	150.82	5	1	1
SAN JOAQUIN DELTA	9	142.00	5	1	2
BUTTE	7	177.76	4	1	1
MT. SAN ANTONIO	7	130.81	6	1	1
REEDLEY	6	126.56	5		1
SIERRA	6	57.26	2	1	1
BAKERSFIELD	5	NA	3	1	1
PORTERVILLE	2	NA			
COLLEGE OF SEQUOIAS	5	87.79	3	1	
SHASTA	5	142.24	4	1	1
WEST HILLS	5	106.17	3		
LASSEN	4	24.98	1		2
MERCED	4	109.11	4	1	1
ORANGE COAST	4	66.48	4	1	1
SANTA ROSA	4	24.03	2		1
COLLEGE OF THE DESERT	3	19.64	4	1	
FULLERTON	3	NA	4	2	
HARTNELL	3	55.56	2	1	
SAN FRANCISCO	3	NA	1	1	
VENTURA	3	140.64	3	2	1
MOORPARK	2	NA			
AMERICAN RIVER	2	51.65	2	1	1
HANCOCK	2	NA	1		
IMPERIAL	2	26.54	2		
COLLEGE OF THE REDWOODS	2	26.08	1	1	1
SAN BERNARDINO	2	29.37	1	1	
SAN DIEGO MESA	2	45.05	1	1	
SAN MATEO	2	49.61	1	1	
SISKIYOUS	2	11.44	1		1
YUBA	2	21.35	2		
ANTELOPE VALLEY	1	33.15	3	1	
MIRA COSTA	1	25.08	1	1	
NAPA	1	16.86	1	1	
FEATHER RIVER	1	NA	1	1	1
MERRITT	1	41.04			

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[1] DATA ON AVERAGE DAILY ATTENDANCE, SIZE OF FACULTY, AND APPROVED OPTIONS PROVIDED BY THE OFFICE OF THE CHANCELLOR, CALIFORNIA COMMUNITY COLLEGES.

In multiple-faculty departments the most frequent pattern is to have one person (or more) primarily responsible for curricula in ornamental horticulture-landscaping; another responsible for programs in natural resources; and others primarily responsible for "agriculture." There is a healthy degree of overlap depending upon the major areas of competence of the faculty.

D. FREQUENCY OF CURRICULA

In those Community Colleges offering work in agriculture there are as few as one to as many as eight separate options available to students in some aspect of agriculture and natural resources. Data on frequency reflect the substantial growth in recent years in the ornamental-landscape and natural-resources fields. The following table illustrates the frequency with which different options are offered:

Ornamentals-Landscaping		27
Ornamental Horticulture	21	
Landscape Horticulture	3	
Retail Nursery	2	
Floral Design	1	
Natural Resources		21
Forestry (± Wildlife)	13	
Forest Technology	2	
Natural Resources	5	
Parks and Recreation	1	
Production Agriculture		21
General Agricultural Production	14	
Animal Production	4	
Plant Production	3	
Agricultural Business		19
Agribusiness	18	
Sales and Services	1	

Agricultural Mechanics - - - - - - - - - - - - -		12
Agricultural Mechanics (Engineering)	10	
Farm Machinery	1	
Mechanized Agriculture	1	
Miscellaneous - - - - - - - - - - - - - - - - - -		6
Agricultural Resources	2	
Laboratory Animal Care	2	
Agricultural Processing	1	
Agricultural Inspection	1	
	TOTAL	85
	(58 in "Agriculture")	

In view of projected manpower needs it is surprising that there are not more individual programs in the areas of agricultural business and agricultural mechanics. This may be explained by assuming that most students in the highly popular "production" options receive varying degrees of training in both "agribusiness" and "shop," and that graduates of these options may move into the employment market in these fields. Another alternative may be that graduates of programs in (nonagricultural) business and mechanics move into these employment areas.

E. STRENGTHENING THE COMMUNITY COLLEGE PROGRAM

In a booklet entitled Agricultural Technicians, published by the Agriculture Department of Modesto Junior College in 1963, considerable space is given to agricultural technicians, including some of their own graduates. Seventy-five percent of the respondents had had some college training. In response to a question regarding skills and competencies which they needed in their daily work, seven basic or nonagricultural skills were listed more frequently than any specific agricultural disciplines. These were as follows:

Discipline	Percentage
Mathematics	95%
Composition	83
Bacteriology-Parasitology	82
Entomology	72
General Psychology	71
Public Speaking	70
Accounting-Bookkeeping	66

In response to oral questioning regarding the courses or experiences that they felt to be of most value in their daily work, again the general education portion of their training rated high.

Discipline	Percentage
Mathematics	48%
Public Speaking	29
Shop Skills	29
Soils	29
Chemistry	28
English	20
Community Activities	20

When asked what courses they would like to take in order to increase their proficiency in their jobs, they mentioned the following:

Discipline	Percentage
Mathematics	46%
Elementary Chemistry	45
Public Speaking	28
Horticulture and Crops	28
Soil and Fertilizer	26
Shop and Engineering	23
Business Administration	22
Bookkeeping and Accounting	19
Entomology	17
English	16

The uniform response of nearly all technicians reaffirms, again, the importance of educational basics. Emphasis should be placed upon the applied value of these subjects. Almost to a man, the individuals were concerned with skills in plain arithmetic, with occasional need for elementary applications of algebra, geometry, and trigonometry. Also somewhat surprising was the frequency with which individuals, many in responsible positions, confessed to a feeling of inadequacy when it became necessary to submit reports, prepare a talk, or write a business letter. The Modesto study quotes a forest ranger as responding, "Those courses I thought were a waste of time in college are most important to me now -- English, Writing, Speaking."

Although the Modesto study does not indicate the level or type of formal training the respondents had had in these disciplines or whether or not they were satisfied with such training, the department of agriculture at Modesto established courses in such areas as agricultural mathematics and agricultural English to cater directly to the needs of their own students.

- Those areas of the Community College program in which greatest improvements for a majority of students could be made are:

1. More emphasis on training in the practical aspects of mathematics, communications, and social sciences.
2. Early identification of potential transfer students and counseling them into both the basic sciences and general education courses.
3. Greater collaboration with other elements of the campus (e.g., biology, business, mechanics) in the design and offering of broadly based courses for students in several options.
4. Greater caution in the use of work projects.
5. Improved collaboration with agricultural programs at other colleges.

CHAPTER V

PROGRAMS IN THE STATE COLLEGES

A. THE BACCALAUREATE GRADUATE IN AGRICULTURE

The changing needs of the baccalaureate graduate as he prepares for employment in the agricultural industry of the future is clearly presented in a series of reports from conferences and committees organized by the Commission on Education in Agriculture and Natural Resources (CEANAR) under the aegis of the National Research Council -- National Academy of Science. Most apparent is the projected requirement for greater sophistication in mathematics and the biological and physical sciences.

Although there is wide variation from state to state and institution to institution, Eldridge[1] states that the following distribution of components for general, science-oriented, and business-oriented curricula in agriculture and natural resources is typcial at the present time.

Component	General	Science Oriented	Business Oriented
Agriculture	30%	24%	24%
Biological Sciences	15	18	12
Business and Economics	--	--	16
Humanities (including Communications)	10	10	10
Physical Sciences and Mathematics	15	24	12
Social Sciences	10	10	10
Electives	18	12	14
Miscellaneous	2	2	2

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[1] Franklin E. Eldridge, "Trends and Goals in Undergraduate Curricula in Agriculture and Natural Resources," Undergraduate Education in the Physical Sciences and Mathematics For Students in Agriculture and Natural Resources. National Academy of Sciences, November 1970.

Eldridge anticipates that these components will be relatively stable as to distribution for at least ten years, but that there will be significant change in the content of the courses in the component. He suggests that if any component increases significantly it will probably be the humanities (including communications).

Many other authors suggest that even greater strength in the basic disciplines will be needed by those who are to compete for responsible positions in the agricultural industry of the future. For example, the Panel on Mathematics (CEANAR) makes a very strong argument for greater competence in mathematics by those who would compete for positions as little as fifteen years in the future. The panel recommends that ". . .the high school student who expects to obtain a degree in agriculture and natural resources or in one of the supporting fields should take four years of college-preparatory mathematics. By doing so, and by continuing to study mathematics in college he will broaden the spectrum of specialities from which he may choose at any stage of his education. . .. A college student who lacks four years of preparatory mathematics will find many choices closed to him. . .."[1]

This panel recommends college mathematics competencies as indicated below:

Agriculture Education--Collegiate courses in Introductory Calculus, Probability, and Introduction to Computing. (Approximately 14-16 quarter units.)

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[1] Commission on Education and Natural Resources. "Undergraduate Education in Physical Sciences and Mathematics for Students in Agriculture and Natural Resources." Report of the Committee on Mathematics, Washington, D.C.: National Academy of Sciences, 1970.

Agricultural Technology--As above, but with additional courses in Multivariable Calculus and Statistical Inference. (Approximately 22-27 quarter units.)

Agricultural Sciences--As for students in agricultural technology but with additional courses in Linear Algebra and Theory and Techniques of Calculus. It is suggested that a brief course in programming should be substituted for the Introduction to Computing. (Approximately 28-33 quarter units.)

While few can deny the necessity of strong backgrounds in the basic disciplines for the agricultural scientist of the future, it is improbable that those preparing for the greater number of technical and management positions will be equally prepared. They will need an understanding of the ways and implications of science and mathematics and have sufficient appreciation so that they will be aware of the assistance the scientist can give. The technologist and manager will require greater competencies in social sciences and humanistic skills.

In its final report published in 1971 by the Academy of Sciences, the CEANAR Committee on the Social Sciences emphasized the need for improving the social science competence of students in agricultural and natural resources curricula. Although they recommend that 15 to 20 percent of the total curriculum be devoted to the social sciences, they admit that little can be accomplished by ". . .carving the curricular pie in a different way."[1]

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1. Committee on Education in Agriculture and Natural Sciences. Report of the Committee on Social Sciences, "Social Science Needs for Undergraduates in Agriculture and Natural Resources." (Washington, D.C.; National Academy of Sciences, 1971.)

Six distinct social sciences constitute the major core of subject matter areas that are of major importance to students of agriculture. These are: anthropology, economics, geography, political science, psychology, and sociology. The Committee notes that few students are exposed to a broad overview of the social sciences and suggests that every student should study, in some depth, at least two of the areas. It suggests that the long-range solution lies in curricular reform (in the development of new courses, new textbooks, new case studies, and new applications), which in turn depends upon improved communication between the faculties in agriculture and in social sciences and the overcoming of resistance to change.

B. PROGRAMS IN THE CALIFORNIA STATE COLLEGES

Despite certain differences in the emphasis in the programs of agriculture offered at the four State Colleges, they all view their primary mission as the production of baccalaureate graduates ready to step into the various aspects of the agricultural industry with a minimum of on-the-job training. As a secondary objective they are attempting to prepare students for graduate study in the applied agricultural fields. Teaching programs in the State Colleges strongly resemble those of the land-grant institutions in many of the states and, in fact, are filling the void for mass training of a number of students not eligible for entrance into the University of California. Programs at the four institutions do differ with respect to the areas of specialization to which they have given priority. These reflect the agriculture of the local community, the demand by students, and, to some degree, the maturity of the institution itself. For example, at Chico State College the major emphasis has been on animal science, although there is a renewed interest in the plant sciences, particularly in the area of the tree fruits. At Fresno, highest priority has been given to the plant sciences. The same is true at Pomona, where there is strong emphasis on ornamental horticulture not found elsewhere. At San Luis Obispo, the strong programs seem to be in animal science, food science, agricultural mechanics, and agricultural management.

It has been popular, on occasion, for persons to propose a high degree of specialization at each campus offering programs in agriculture (e.g., the Brinser Report on New England agricultural programs). Proponents of this idea have suggested that one campus might concentrate exclusively in animal science, one in plant science, one in soils, one in management, etc. The fallacy in this approach is obvious. One cannot operate a first-class program in animal science, for example, unless it is based on a sound program in pasture management, which means supporting work in agronomy, soils, entomology, etc. It is probable that a meaningful program in plant agriculture could be operated with no animal agriculture, but not the reverse. Certainly it is not only possible, but also desirable for each campus to define its major areas of emphasis and excellence.

Enrollments in agriculture in the State College system increased only 14 percent between the years 1963 and 1969,[1] while total enrollments in the colleges grew at an unprecedented rate. There was an overall increase of only 300 students in agricultural programs during this period with the largest percentage growth being exhibited by Fresno (30%) and Pomona (13.4%). The stability of enrollments over the past decade probably relates to the establishment of quota systems, to a decline in interest on the part of students, and to the increased role which the Community Colleges assumed in the production of agricultural technicians.

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[1] Report of the Division of Institutional Research. Office of the Chancellor, The California State Colleges. August 5, 1970.

The State Colleges are doing an effective job in producing certain types of graduates that are needed by the agricultural industry. But the average student who graduates from these programs has a minimal background in the fundamental sciences and mathematics on which to further his own education while on the job. Only the exceptional student really develops a sound academic background in the pure biological, physical, and mathematical sciences sufficient to continue either formal or informal study of modern agriculture. Those who go on to graduate school and the more academic fields usually find themselves with numerous deficiencies to make up. The obvious solution to this, of course, is to include more basic science and mathematics in the undergraduate program at the expense of the high degree of specialization that is found in many areas. The typical State College agriculture curriculum is also deficient in the social sciences, the humanities, and the communication skills.

Some of the greatest weaknesses in the programs in the State Colleges are brought on by their own activities. There is an unwholesome level of competition among the several campuses in recruiting students from the Community Colleges. The separate articulation of each college with the two-year institutions, together with the desire for numbers of students, has created a situation in which many students enter who do not have an adequate background for advanced courses in agriculture and who frequently are extremely deficient in the lower division general education components of their baccalaureate program. In many cases the excessive number of agricultural courses allowed and the deficiency in nonagricultural courses severely limits the number of courses in agriculture the student may take while fulfilling his degree requirements, and yet he is graduated from the State College with a major in agriculture. In some cases credit is allowed for courses taught without the prerequisites required for the same course on the State College campus.

- There is a critical need to distinguish the differences between the requirements for an Associate of Arts degree in vocational fields such as agriculture and the requirements for transfer to a four-year baccalaureate program. It is imperative that the State Colleges take the lead in reviewing the meaning of their degree and the standard of the academic work which they offer. In comparison to the standards of the leading land-grant institutions, they are minimal. Much of this has resulted from the "liberalization" of the policy and procedures related to the transfer of courses from the Community Colleges. State Colleges must also redefine the nature of their own freshman and sophomore programs and set firm guidelines for the acceptance of transfer credit.

Suggested as desirable for the lower division work in a State College is the following program:

Chemistry: 1 year appropriate to the high school background

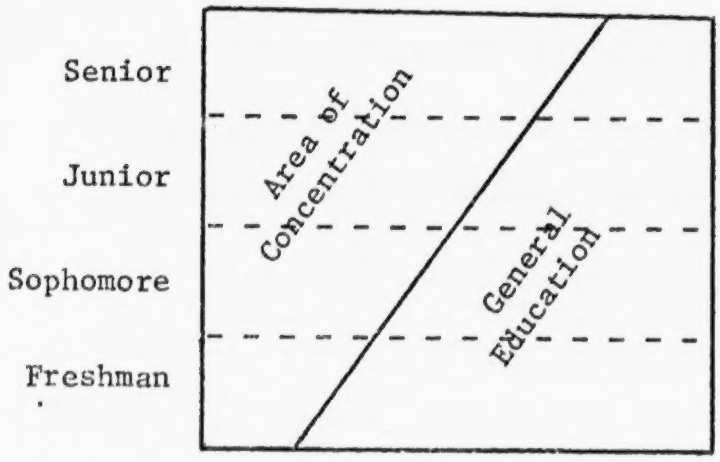
Biology (or Botany and Zoology): 1 year

Mathematics: Proficiency to a certain level as determined by tests administered by the mathematics Department. Suggested proficiency through certain concepts of trigonometry and probability

Composition: Proficiency to a predefined level. Proficiency to be determined by the English Department.

Agriculture: Maximum of six courses. Not over one course per semester (quarter) during freshman year, and not over two courses per semester (quarter) in the sophomore year, exclusive of "orientation" and perhaps basic economics.

The remained of the work -- perhaps one-third of the total -- should be devoted to general education requirements. This is not to imply that all courses in the social sciences and humanities should be taken during the freshman and sophomore years. General education must be a continuing experience, and it is highly desirable that the student continue his contacts with the basic and broadening disciplines throughout this academic career and in later life as well. The "ideal" college experience can be portrayed as shown in the following diagram:



It is imperative that the State Colleges (as the University has already done) insist that Community College transfer students receive credit only for those professional courses that are of equivalent rigor to those given at the State Colleges. Such offerings as courses in soils without a chemistry prerequisite must not be allowed to substitute for a course designed for a baccalaureate program. A definite limit should be established on the number of courses which will be accepted by any State College on transfer. This number should be comparable to the number allowed the native student during his first two years in the State College.

These are drastic recommendations, but there appears no other way to correct the chaos that the present articulation system has created. There is, in these recommendations, no implication that the large number of courses offered in the Community Colleges are not excellent vocational training experiences, but by no stretch of the imagination can many of them be considered as being of baccalaureate calibre. It is true that this will work a hardship on the student whose original intent was a two-year vocational program but who later changed his goal to working toward a B.S. in

Agriculture. This should be readily offset by the assurance that those students planning to transfer will be better prepared, and it will certainly contribute toward more responsible counseling of all students within the Community College system.

Within the State Colleges, there is excessive proliferation of courses at the undergraduate level in a number of areas. For example, fifteen (quarter) courses in "International Agriculture" on one campus would seem to be excessive, particularly in view of the limited number of majors electing this option. Certainly, an equally well-trained or better-prepared graduate could be produced in a curriculum stressing the basic natural and social sciences and agricultural theory with a limited number of courses dealing with the international dimension. Especially valuable would be courses in cooperative cultural anthropology, and cultural geography. The number of undergraduate courses in animal science (including dairy husbandry, poultry, and "veterinary science") varies from thirty-one to thirty-four (87 to 104 semester credit hours) on the two campuses on the semester system, and forty-seven to seventy (143 to 211 credits) on the campuses on the quarter system. It is extremely difficult to justify twenty-nine undergraduate courses in animal husbandry, seventeen in dairy husbandry, nineteen in poultry science, and five in "veterinary science" on a single campus. The great majority of these courses are electives in the major, and only a few are established as "general education" courses for the campus as a whole.

Many graduates of the State College system do progress into graduate school and are successful. Usually they enter with deficiencies in the basic sciences, social sciences, and humanities in comparison with students from other universities.

The graduate programs on the State College campuses could be improved if enrollments were sufficient to allow the development of sequences of graduate-level courses. At present, most work taken for graduate credit is in classes together with undergraduates with varying levels of preparation. Add to this the fact that the graduate program is geared, primarily, for students who have come through the undergraduate program at the same institution and who, generally, are deficient in the basic sciences, communication skills, etc. The courses presently offered are not comparable with those offered at the graduate level at most other institutions. There appears to be little effort made to have these students overcome what other graduate institutions would consider deficiencies while working toward the master's degree. These programs should be examined critically to determine if there is sufficient demand for the number of existing programs and if their quality is such as to justify their continuance.

Programs in "agricultural education" suffer the same weaknesses as do similar programs around the nation. Many graduates are weak in the communication skills, humanities, social sciences, and basic sciences. So much time is required of the students in taking introductory courses in many areas of agriculture, plus a degree of specialization in one or more fields, that even the five-year curriculum does not allow sound general education. Until this deficiency can be corrected, the high school "Vo-Ag" teacher will continue to have a poor image among his professional colleagues despite his higher salary. Again, there is no question but what much time could be saved in the curriculum itself through the consolidation of courses. Fewer professional courses would be needed if those taught were based on a sound background in the sciences and mathematics. Again there is no question but what much time could be saved in the curriculum itself with a little imaginative planning. Given a more adequate background in the sciences and mathematics, the professional courses could be consolidated and presented in a more meaningful way. The similar background would also be to the advantage of those continuing on into graduate study.

The State Colleges also allow or, in some cases, require students to conduct a "project" or work experience similar to those conducted by the Community Colleges. There can be no question of the value of a limited amount of this type of activity, and with careful counseling it can certainly be justified. Whether or not academic credit should be awarded for more than a minimum of such activity is highly debatable, and certainly when it is carried to excess is a detriment to the student by preventing him from getting the breadth of theoretical experience in other areas both within and without the field of agriculture. Both the Community and State Colleges should place a self-imposed limit on the number of credits allowed for "work project" activities. Probably a maximum of four quarter units should be allowed for the associate degree, and no more than a total of eight should be allowed for the baccalaureate. This should not preclude the possibility of, or even the requirement for, additional work experience on an extracurricular basis.

For a number of years three of the State Colleges operated two/three-year technical programs using the same facilities, staff, and, in some cases, even courses that were used in the four-year academic programs. These programs were attacked as "unfair competition" to the Community Colleges and also that they tended to downgrade the standards of the four-year curricula since there was a considerable degree of transfer from the two-year to four-year programs. In recent years, two of these programs have been phased out because of low enrollments. The one remaining program should be carefully examined to determine whether it should not also be discontinued. Its impact on the upgrading of the four-year curricula is particularly critical.

The facilities and faculty of the State Colleges could be used more effectively in technician training programs by the organization of "short courses" or other specialized training programs for students in Community Colleges or interested citizens on a scheduled basis. It is highly likely that industry would send key personnel for special training of this nature. This would have the further advantage of eliminating the need for many Community Colleges to duplicate certain expensive facilities.

CHAPTER VI

PROGRAMS AT THE UNIVERSITY OF CALIFORNIA

The undergraduate programs in agriculture on the University's campuses are unique among those in the nation and have greatly influenced the evolution of instructional programs throughout the country. Their main emphasis, whether expressed or not, has been the production of graduates well prepared in the basic disciplines, who can continue on to graduate schools in the recognized agricultural specialties. In this function the University has excelled. Many graduates, however, directly enter employment within the agricultural industry that leads to mid-management or top-management positions. These students frequently need in-service training after they join a company to learn the particular techniques and skills of the industry involved.

Enrollments in agriculture at the University level have been practically constant since 1965. Analytical studies compiled by U.C. Berkeley for the entire University system show an increase of less than 150 students over the period from 1965 (2051) to 1969 (2180). On the Berkeley campus there has been a general decline in undergraduate majors, from 559 in 1950 to 299 in 1960 to 215 in 1969. This has been offset by a marked increase in the number of graduate students since the mid-1960s.

Enrollments at Davis have been somewhat erratic and have not yet stabilized following the change in emphasis and standards of that campus. On a percentage basis the data for Riverside is most impressive, enrollments having doubled at the undergraduate level and nearly tripled at the graduate level between 1967 and 1968. However, this is probably a reflection of the reorganization of the College and the inclusion of biology as a portion of it, rather than an indication of any major increase in interest in traditional agricultural programs.

Duplication of effort at the undergraduate level does exist among the three University campuses (Berkeley, Davis, and Riverside) which offer major programs in agriculture and yet each has unique features that set them apart from the others and justify their existence, at least, in so far as program is concerned. Whether they can be justified in all cases on the basis of numbers of students and cost of program is another issue. There is no question but that if consolidation were attempted by phasing work out at one campus and moving it to another the unique nature of the program would be lost.

A. BERKELEY CAMPUS

Berkeley's undergraduate instructional program is the smallest and might seem superficially to be expendable. Cost analysis figures are needed to determine this with certainty, but it is highly probable that it is not out of line. The extremely strong research and graduate instructional programs probably underwrite the bulk of the costs. The elaborate equipment and the strong faculty should be utilized in undergraduate training where possible.

Berkeley's prime thrust is on the basic sciences underlying agriculture. The programs in genetics, nutrition, agricultural economics, plant pathology, and entomology are distinct in that they deal almost exclusively with the basic and theoretical aspects of the disciplines. Orientation to solving problems of the industry comes primarily in the programs of research, both graduate and faculty. In view of the nature of the program, the activity of the College is closely allied to the basic biological, physical, and social sciences, and duplication of effort could be reduced by closer cooperation between the departments in agriculture and the basic biological, physical and social disciplines. A complete fusion, however, would probably be to the disadvantage of the agricultural interests.

Berkeley does not attract transfer students from the agricultural programs in the Community Colleges, primarily because of its policy of not allowing transfer credit for lower-division courses in agriculture. At Berkeley, agriculture is basically an upper-division program based on a sound background in fundamental scientific and social science disciplines. Most of its transfer students are recruited from "college prep" programs in the Community Colleges. It is also surprising that few students transfer from the State Colleges to Berkeley as undergraduates.

Within the Community Colleges the agriculture faculty does not think of Berkeley as an outlet for their better students. Few of the two-year instructors have more than a superficial appreciation of the program at Berkeley and recognize no similarity between their efforts and those at Berkeley.

B. DAVIS CAMPUS

Although the Davis campus more nearly resembles the traditional college of agriculture in land-grant institutions, it is pioneering in organizational and curricular approaches to the changing definition of agriculture. The Davis faculty radically revised its departmental and degree structure so recently that it is difficult to evaluate its program. Every indication would suggest that it is meeting the challenge and needs of the changing industry. The emphasis on environmental quality on a broad front gives it great flexibility in producing graduates who will find employment in a variety of newly recognized fields of endeavor.

The high degree of cooperation and collaboration between the College of Agricultural and Environmental Sciences and other units of the Davis campus is most encouraging. Steps to break down the high degree of autonomy of departments and colleges are most worth while if motivated by the desire to maximize the use of the entire campus's expertise in the training of students and the solution of problems. The amalgamation of certain biological departments in both the College of Agricultural and Environmental Sciences and the College of Letters and Science into a functional coordinated unit bodes well for both instructional and research endeavors.

Davis graduates are in strong demand both as graduate students and for direct employment in industry. Depending on option (major) the students may need more in-service training in specific jobs than do graduates of the State Colleges, but probably less than do Berkeley graduates. The typical graduate of Davis has a sufficiently strong background in general education to equip him for responsible citizenship.

Davis receives the greatest number of transfer students from agricultural programs in Community Colleges of any of the University campuses. This probably results from the greater familiarity of the two-year college faculty members with the Davis campus. Many of them received either their baccalaureate degree, their teacher certification, or a master's degree from Davis. It is true that many agriculture instructors in the Community Colleges have reservations about the recent innovations in curriculum that have been adopted at Davis and are beginning to direct students to the more traditional programs at the State Colleges.

C. RIVERSIDE

The agricultural program at the Riverside campus is relatively new. As a result, it is less bound by tradition, and it has been possible to experiment with new and innovative approaches to university education in agriculture. Riverside's emphasis does reflect the heritage of the "Citrus Experiment Station" and stresses the plant and soil sciences, as well as the economics and management of the production, processing, and marketing of crop species.

The program at Riverside is unique in that it is closely joined with the basic natural sciences. In view of the evolution of the agricultural industry and what can be anticipated in the future, this would seem to be an extremely sound move. Unfortunately, it has not been "sold" widely to graduates of high schools or the Community Colleges and enrollments are disappointingly low at this point in time. The philosophy behind the Riverside "experiment" is based on the assumption that agriculture of the future needs, not generalists who need to know a little science (or social science), but scientists and social scientists who have an appreciation of the agricultural industry.

The approach the Riverside campus has taken, combining the agricultural and biological sciences into a single college and promoting close liaison with other basic science departments, is most exciting and refreshing. It should allow the development of one of the strongest university programs to be found anywhere in this country for the training of the type of agriculturalist needed in the future. In theory, by integrating the basic and agricultural sciences, a great deal of duplication can be eliminated and strong mission-oriented scientists can be produced. There are indications that not all of the "basic" scientists within the College grasped the unique opportunities that were available to them. The tradition of departmental autonomy and the old disdain of applied research on the part of the "pure scientists," tended to polarize the College into two camps. It is unfortunate that the biologists did not immediately see the opportunities that they had to develop a truly unique department but set their goals on the traditional criteria of excellence established in institutions where biology is part of the liberal arts. Similarly, some of the agriculturalists felt that they had lost autonomy and the ability to carry out traditional programs as a result of the affiliation.

No one can question the strength of the individual departments or the scientists of which they are comprised. Individually and collectively they are outstanding, and it is hoped that in time the department will realize the potential that is theirs.

The Riverside campus does not offer a major in animal science, although there is some local interest in expanding into this area. There are problems of the animal industries in southern California that are unique, so that an argument could be made for the establishment of a research group as a part of the Experiment Station. No doubt an undergraduate instructional program would attract students. Question does exist, however, with respect to need for either a graduate or undergraduate program. The number of personnel needed at the level of training that one would foresee coming from a program in animal science at Riverside is limited. The bulk of the needs of the industry can be fulfilled by graduates from the State Colleges, and the Davis campus can probably supply all of the basically trained bachelor's-level students and personnel holding graduate degrees that the State needs. It would seem unwise for Riverside to move into the animal science area.

The image of the Riverside agricultural program among the agricultural teachers in Community Colleges is very low. Most of them frankly state that they do not even suggest the possibility of going to Riverside to their students. The exceptions are the instructors in ornamental horticulture and citriculture in southern California. It is true that most of the Community Colleges are not attempting to train transfer students for any of the University campuses, but they have a particular distrust of the program at

Riverside, because in part, they see in it a threat to the autonomy of agriculture as a separate discipline. In the minds of others it remains only the "Citrus Experiment Station." If the College aspires to receiving transfers from agricultural programs in the Community Colleges, it is going to have to launch an extensive public relations campaign directed toward the two-year institutions. Biology instructors in the Community Colleges also view Riverside with caution, possibly because of their mistrust of the alliance of biology with agriculture.

D. LOS ANGELES

UCLA retains a few courses in horticulture within the Department of Botany. These are a remnant of an appreciable program in agriculture some years ago. It is hoped that entomologists, geneticists, and plant pathologists will remain as a portion of a department of biological sciences. The economics department should similarly have faculty competent in the agricultural dimension.

CHAPTER VII

TRANSFER AND ARTICULATION PROBLEMS

Since there is very little transfer from agricultural programs in the Community Colleges to the University, there has been minimum effort expended in determining comparability of courses and the desired sequences for transfer students. Those who enter the University from Community Colleges are more prone to come from a general education or liberal arts program.

A great deal of effort is expended in attempts at articulation between the Community College and the State College programs in agriculture. Unfortunately, although there are statewide meetings at which mutual problems are explored, the decisions on course similarity, courses to be accepted for transfer, and related items are accomplished on a school-to-school basis. This practice has, at one and the same time, helped increase State College enrollments and sorely downgraded their programs in applied agriculture. The State Colleges are competing against each other for enrollments in a most unhealthy fashion. They should be working together to upgrade the graduates of their institutions and to define more clearly their mission and goals.

In their effort to recruit, the State Colleges are accepting an excessive number of technical and vocational credits. They have not insisted that the students they accept on transfer be adequately prepared in the basic sciences, the social sciences, and the humanities. They have been accepting credits in "advanced" courses taught without the prerequisites which a college-level course should have.

The Community Colleges should take more of the responsibility for identifying and counseling the potential baccalaureate student. Any student who professes an interest in transfer or who has test scores suggesting that he has the capacity for University or for State College work at the level recommended in this report should be advised to enroll at his earliest opportunity in some of the basic physical, mathematical, biological, and social sciences, and in the humanities. Those who cannot compete can gracefully complete a solid vocationally oriented program. Those who are successful should be encouraged to satisfy a maximum of their "general education" and basic science requirements while still taking the appropriate introductory courses in agriculture.

The State Colleges, by their practice of accepting more and more transfer work in order to compete successfully in the recruiting game, have sorely downgraded their programs of applied agriculture. Were they to agree on the level and amount of work they would accept they would find that the two-year colleges would readily adapt to the demand. The Community Colleges would probably find, simultaneously, that their student interest, time to devote to students, etc., would also improve.

A. GENERAL RECOMMENDATIONS

The State Colleges should agree to the number and rigor of courses to be accepted from the Community Colleges. A maximum of one basic introductory course in agriculture per semester would appear to be a good base from which to start discussions. By limiting the number of courses which they will accept, the State Colleges can force those students who are in transfer programs into their basic biological, mathematical, and physical science courses and into more general education while still at the Community College. The State Colleges should agree not to accept "advanced" courses open to persons without basic science prerequisites. For example, only courses in soils based on a knowledge of chemistry at the introductory college level should be accepted for transfer. Acceptable courses in "plant propagation" might have prerequisites of at least botany, if not plant physiology.

B. A CASE HISTORY

The following is recontructed from the examination of the transcripts of one recent graduate from a State College.

An out-of-state student attended a Community College for two years and was honorably dismissed, but without the Associate degree, after two years of work with a GPA of 2.94. The Community College catalogue clearly specifies the general education requirements of the several State Colleges and claims to have adopted a pattern whereby the student may satisfy these prior to transfer. By implication, the catalogue of the State College in question advises students to complete as many of their general education requirements as possible at the Community College to enable them to spend as much of their effort as possible in their major area of concentration subsequent to transfer.

This particular student transferred 60 of his 66 units (the 6 being specified in the catalogue as not for transfer). Three of these six were in basic communications skills.

Area	Hours Transferred	Hours recommended by State College
Natural Science	0	6
Social Science	6	12
Humanities	0	6
Basic Communications	6	9
Health Education, Physical Education, and Electives	4	7

At the State College the student enrolled in and received credit for an additional 55 units (GPA 2.2) for a cumulative total of 116. Of the 55 units at the State College, 29 were in agriculture and 27 in general education, including the sciences basic to agriculture. In total, the student received credit in only 46 units of nonagricultural courses, including "excessive" requirements in the physical sciences. The student never did fulfill the minimum requirements in basic communications skills specified by the Community College. This was apparently avoided in the State College program by accepting a course that was designated by the particular Community College as nontransferable. All of the "basic" freshman science courses, totaling 14 units, were taken during the senior year. His GPA on these freshman courses was 1.21.

Prior to his senior year this student registered for and received credit in one course in agriculture for which two basic science courses were listed as prerequisites. One of these (Organic Chemistry) never was taken, although the catalogue description of the major indicates it to be a course required for graduation.

In several transcripts examined it was noted that the State Colleges frequently accept excess agricultural courses as substitutes for part of the requirements in basic sciences or general education, e.g., introductory plant science and introductory animal science in lieu of natural science courses. "Advanced" agricultural courses are frequently allowed as electives. This would seem to be valid for nonagricultural students, but should not be allowed for those majoring in agricultural programs.

C. AN ALTERNATIVE TO "ARTICULATION AGREEMENTS"

The recommendations of the recent report of the Carnegie Commission on Higher Education entitled Less Time, More Options are as applicable to the programs in agriculture as to those in any discipline. Two-and four-year programs could be shortened appreciably for many students by the elimination of duplication and repetition. The use of advanced-placement techniques coupled with self-paced learning programs could eliminate for many students the boredom of repeating material that he has already mastered. Such techniques would be of greatest benefit for those students entering Community College from a strong vocational agriculture program in high school, and at the time of transfer from Community College to a State College or the University. With or without pretesting, a student could build on his background by simply following a hierarchy of learning experiences (in which he would be demonstrating competence) until he had mastered the concepts of the course in question. The stronger the student's background, the more rapidly he could progress.

The reluctance of college and university instructors to adopt such techniques stems, in large measure, from their inability to conceive of "packaging" subject matter into other than standard courses of three and four semester (or quarter) credit hours.

In establishing equivalency of courses by present articulation agreements, the instructor in the "senior" school must be satisfied that there is some arbitrary percentage of similarity between the two courses and that the student who has passed the one could pass the other. If the course meets this standard, credit is given; if it does not, no credit is awarded and the transferring student, regardless of how much he may know, must retake the course. The same is true of the student wishing to "challenge" a course by taking an examination for credit. He is given full credit or no credit.

Through the imaginative use of pretesting and self-paced learning programs, students could be allowed to build on their backgrounds in certain key courses without the embarrassment and boredom of repeating courses and subject matter.

CHAPTER VIII

MISCELLANEOUS ISSUES

A. ROLE OF THE DIVISION OR COLLEGE OF AGRICULTURE

No one can review the accomplishments of American agriculture over the past century without conceding that the training and research programs conducted by public institutions have contributed significantly to the overall success story. Although deans and directors have been inclined to claim major credit for their institutions, it is quite probable that the U. S., with its wealth of natural resources, its free enterprise system, and its overall technological ability, would have made significant gains in agricultural production without the highly publicly supported educational service geared to the needs of this industry.

The need for trained manpower in agricultural industry is real. Modern agriculture requires personnel trained in skills and concepts through a continuum of levels from high school equivalency to competency in the most sophisticated of research ability. But this need is not unique to the agricultural industry. Outside of the medical and paramedical fields, few other industries are so extensively serviced by publicly supported educational and research programs as is agriculture. The petroleum industry, for example, has nothing similar and yet the industry thrives and has relatively little problem in recruiting manpower. Oil companies recruit geologists, engineers, accountants, managers, and similar professional personnel who have had their training in a basic discipline, often with no emphasis toward the petroleum industry. They recruit machinists, fitters, and other technologists with sufficient skill to adapt to the needs of the job. And, of course, they have many employees with no training other than that which they receive on the job.

It is quite probable that modern agriculture could survive without formal training programs in agriculture at the high school, community college, college, or university level. Large corporations, cooperatives, and other agencies could employ biologists, chemists, engineers, machinists, and persons with other skills who could, with reasonable in-service training, carry out their function of producing, processing, or marketing their commodities. Even research could be carried out by these agencies. In a few areas (e.g., sorghum breeding) many of the agricultural experiment stations have already found that they could not compete with private interests and have largely discontinued their programs.

There are reasons, of course, why colleges of agriculture and agricultural experiment stations were organized with their present degree of autonomy, some of which remain as valid reasons for their continuation. At the time the Morrill Act was signed by President Lincoln, 90 percent of the population of the United States was engaged directly in production agriculture. Few, if any, of the individual units were large enough to engage in in-service training, let alone in research. The margin of profit in agriculture is normally low, particularly in view of the high risks involved. Although agriculture has lost the political force that it once had, its record of accomplishment for the public good is used to validate the need for the continuation of instruction, extension, and research as in the past. But is the system of yesterday still optimum for today in view of the dramatic changes within the industry?

It would be folly indeed to suggest that teaching and research programs in colleges (divisions) of agriculture throughout the nation have not evolved as the industry has changed, but that evolution has been in a direction that reduces the uniqueness of the training of many of those engaged in it. Practically every other industry will hire accountants, management experts, and economists directly from a college of business administration. Why does agriculture have to train its own with courses that must duplicate in large measure the substantive concepts of the courses that the others take? Mechanics trained in vocational-technical schools go to work for foundries, railroads, and all manner of industries, but departments of agriculture have to train farm machinery and tractor mechanics. Why? Typical college courses in agriculture stress basic scientific principles -- the same ones that are taught in biology, chemistry, and physics. Can we afford this degree of duplication?

From the standpoint of the industry, limiting educational and research efforts directly to the field of agriculture is often viewed as desirable. Less in-service training is required. To the person involved in training or research, the maintenance of agriculture as a distinct field allows a sense of security. To the student dedicated to agriculture, the type of program now available is expedient. Normally, he is interested primarily in making good in his first job.

The degree to which departments and colleges of agriculture can be maintained as autonomous units depends largely upon the amount of duplication that can be tolerated and the rate at which the many facets of the industry lose their uniqueness in contrast with other industries. The time has come when educational institutions must maximize not only their cost-effectiveness but also the use of the expertise which they have. The talents of the agriculturalist and his "basic" counterpart in educational institutions must be pooled to provide the best of possible learning experiences for all students at minimal costs. Faculties of colleges (divisions) of agriculture have much to contribute to the strength of the remainder of the institution. They also would find that the remainder of the institution could contribute far more to their instructional and research needs than they have been called upon to do in the past.

A few healthy signs of increased collaboration between programs in agriculture and those in other units of the institution are found in the Community Colleges and the four-year institutions. The formation of the College of Biological and Agricultural Sciences at Riverside, the amalgamation of certain biological units from separate Colleges at Davis, and the development, in a few Community Colleges, of programs in shop practice, welding, and agricultural business using the expertise of two or more divisions and the sharing of facilities, are most encouraging. These have the potential for not only reducing duplication, and hence costs, but of producing a more broadly trained, more versatile graduate than any single unit alone could do.

B. INTERINSTITUTIONAL COLLABORATION

It is only natural that legislators and members of governing boards should question the need for the duplication of programs between similar institutions within the same state, and certainly in certain specialties the elimination of duplication or the prevention of its development is a highly cost-effective procedure. A good example is the limiting of State College programs in forestry to the one at Humboldt State. Although it is a highly popular program and enrollments are soaring, the job market suggests that this single school can meet the needs of the State of California. It would be unwise to allow the duplication of this expensive program elsewhere. Another example is the lack of a program in animal science at Riverside. So long as Davis and the State College system can provide for the needs of the State, there is no valid reason for developing a program that would be both duplicatory and expensive.

Some rather absurd proposals have been made for the elimination of duplication in programs in agriculture. The Brinser Report of the early 1960's called for each of the land-grant colleges in New England to specialize in a separate field and to eliminate the other areas. For example, New Hampshire was to specialize in forestry, Connecticut in poultry, Rhode Island in floriculture, Maine in vegetable culture, Massachusetts in animal science, etc. In considering this recommendation it soon became obvious that the various fields were so interrelated and interdependent, and the basic concepts often so similar, that there could be, in fact, little savings in manpower needs at the undergraduate level. One could not train, for example, a first-class animal scientist without exposing him to solid study of pasture management, which in turn required a basic understanding of soils.

In some cases, effective intercollegiate collaboration has been accomplished. Oklahoma State University found it could no longer afford to conduct major programs in poultry science and two options in horticulture, fruit production,and vegetable production. By agreement with the University of Arkansas, majors in these areas may take two years of work at Oklahoma State where they receive their background in general education, the basic sciences, and supporting agricultural courses. Their junior and senior years are spent in intensive work in their major at Arkansas, which for purposes of tuition classifies them as resident students, with their degrees being awarded by the latter institution.

There certainly is a possibility for collaboration between units of higher education in California toward elimination of duplication, particularly in low-enrollment and high-cost programs. Decisions should be made carefully and not only on the basis of costs. For example, the undergraduate program at Berkeley is low in enrollment and probably of high cost (however, see Chapter VI) and yet it is highly unique and serves a function that possibly could not be duplicated elsewhere.

Numerous possibilities for the elimination of duplication come immediately to mind. Adjacent Community College districts could join efforts to develop a single program, or separate programs, using the same facilities. There exist a number of programs with low enrollments within easy commuting distance that would profit greatly from complete consolidation.

Programs requiring costly capital outlay or high operating expenses could be operated on a regional basis using already existing facilities and faculty at one of the Community College, State College, or University campuses. A hypothetical example might be dairy herd management. Few Community Colleges can afford herds, milking parlors, quality control laboratories, etc. Yet there are probably students in most of them that would like a first-class training experience in this area. The individual Community Colleges could give the student the theoretical background and then have him attend a "short course" (from a few weeks to a quarter or more) organized at one institution that has excellent faculty and facilities in dairy herd management. With proper planning the host institution could service several institutions simultaneously.

In similar fashion, some "swapping" of faculty and/or consultants between schools could be effective in reducing costs. With a little imagination, neighboring districts could employ specialists on an area-wide basis. These people could rotate on some predefined basis to enrich the training program at two or more institutions.

The State Colleges have rather distinct (but not always clearly defined or agreed upon) areas of emphasis. These could be sharpened even more, giving students a clearer basis for selecting the college they wish to attend during the latter part of their training period, when they may be expected to be specializing in some rather broad area. It is imperative that the State College faculties and/or administrators establish some sort of common standards for the acceptance of transfer credit. The present policy of individual articulation with the several Community Colleges is highly detrimental to the reputation of the State Colleges, both internally and externally.

On the University campuses there is a minimum of overlap. Most of Berkeley's undergraduates major in a basic agriculturally-oriented discipline (e.g., entomology, soils, nutrition, genetics) rather than in a commodity-oriented field. Although this option is also available at Davis and Riverside, an appreciable fraction of their students still specialize in a commodity-oriented area (e.g., olericulture, landscape design, animal science, enolgy, citriculture, etc.)

There appears to be a trend for each of the campuses to move toward specialization in the basic sciences at the undergraduate level. This is as it should be in view of the probable types of employment for this group of baccalaureate students. Although there could be a greater degree of specialization at the various campuses at the undergraduate level, the presence of strong research, and graduate faculties in the several basic disciplines on each campus makes it unnecessary. Savings could be accomplished by greater consolidation of courses and curricula at the undergraduate level.

A few years ago several departmental majors were dropped at Berkeley in favor of a single "Plant Science" major. On paper this looks good, but actually the students in this option specialize to nearly the same degree as they did previously. Such a level of specialization is not essential for the great percentage of the students.

C. AGRICULTURAL EDUCATION

There is probably no program so controversial as "Agricultural Education." Its "opponents" are vehement in its denunçiation, and yet it is staunchly supported both by those in it and by many collegiate and secondary school administrators. Its supporters point to its growth and acceptance in the secondary schools since the passage of the Smith-Hughes Act in 1917. They point not only to the popularity of its instructional program in the high schools, but also to that of the programs for young farmers and adults. They also note that it has evolved with the times in an effort to remain sensitive to the needs of the entire agricultural community.

It has been attacked as a "weak" program because of being generally deficient in nonagricultural breadth requirements, and simultaneously because of a lack of depth in the basic and applied aspects of a major area of concentration. In the high schools it has been criticized as a program that prevents college-bound students from getting an adequate background in languages, mathematics, the basic sciences, and communication skills as preparation for college.

That the program has some merit is indicated by its popularity with many secondary school administrators. Many of these will admit that, being the only vocationally oriented program in their school, it is used to serve a variety of nonacademically oriented students. They point out that it serves a valuable role in motivating students who otherwise might drop out and, further, that it does serve as a pathway to the more vocationally oriented curricula in institutions of higher education. Most administrators are "sold" on the Future Farmers of America (FFA) as a leadership training program for youth, but are almost unanimous in decrying the pressure placed on them for special consideration for trips of judging teams, field days, and other organized FFA activities.

Possibly the most valid criticism that can be leveled at the agricultural education program is the same one that can be directed at many educational programs in agriculture. This is their aloofness from other elements of the institution. The teacher training program in agricultural education is operated nearly as a "closed shop," with little interaction with the college of education or with other training programs for vocational teachers. In the secondary schools they maintain a relatively high degree of autonomy. In both cases, both the institution and the program could profit from closer collaboration.

The action at Fresno State College to integrate its program in agricultural education through the undergraduate as well as the "fifth year" is based on sound pedagogic philosophy, but may create problems for graduates of other institutions that do not offer similar programs. The view was expressed that students completing their baccalaureate degree elsewhere may be at a disadvantage in attempting to schedule all work necessary for certification within the prescribed time period.

There can be no question that graduates of agricultural education programs are versatile individuals. The turnover rate among "Vo-Ag" teachers is high for male instructors. Many of them enter a variety of agriculturally related fields, in part, because of their broad outlook of the field of agriculture, and also because of their knowledge of applied psychology.

D. PROGRAMMED INSTRUCTION

The Independently Prescribed Instruction (IPI) or "process approach" techniques, which have proven to be highly effective learning experiences in a wide variety of disciplines, would be especially beneficial in agricultural programs. Even though they were first devised to teach techniques and skills (adaptable to many agricultural activities) they have proven to be equally useful in teaching theory, concepts, and information.

In these techniques a student progresses through a well-planned hierarchy of learning experiences, each built on one or more prior accomplishments. By pretesting, he learns what portions of the exercise, if any, he must master before proceeding to the next-most-complicated step. The student proceeds at his own pace, and in a properly developed sequence can be expected to master 90 percent of the subject matter. This approach has been used in biology courses at the University of Arizona and Emporia (Kansas) State College with outstanding success. At Oklahoma State University a pre-engineering curriculum including mathematics (through the Calculus), physical sciences (chemistry and physics), and communications (oral, written, graphic, and computer) has been devised based on a completely integrated hierarchy.

Because of the overlap in subject matter covered in secondary school and Community College courses, and in courses taught in Community Colleges without science prerequisites, and those taught in State Colleges with science prerequisites, these modern techniques could be used to allow students to make faster transitions at these two stages of their academic experience. As an example, a student who had had a beginning course in soils without chemistry, could progress much more rapidly through the "standard" soils course by IPI techniques, and would certainly be less bored than if he had to re-enroll in the "higher level" course taught by the traditional lecture-laboratory method. A second advantage is that it assures the instructor of advanced courses that his students have reasonably similar backgrounds in both skills and subject matter.

CHAPTER IX

VETERINARY MEDICINE

The State of California is woefully short of practicing Doctors of Veterinary Medicine (D.V.M.), both for the large-animal agricultural industries and for the small-animal practices in urban centers. There is a sizable in-migration of veterinarians into the State from elsewhere in the nation -- primarily into the small-animal practice in the urban centers. In view of the demand by students for training programs and the continuing needs of the State, there is certainly reason to consider increasing the output of D.V.M.'s within the State of California.

The School of Veterinary Medicine at Davis has been increasing its incoming class size in recent years, but even this effort may not be able to fill the anticipated annual need for veterinarians in the State. There is both an optimum and a maximum class size for the maintenance of a quality program. Rather than exceed this, the planning agencies of the State have given consideration to the establishment of a second college of veterinary medicine somewhere in southern California.

The need for increased numbers of training centers and graduates in the entire United States, and specifically in California, is well documented in the "Preliminary Studies Concerning a Second School of Veterinary Medicine in Southern California," a report prepared by the University of California. The committee which prepared this report strongly urged the establishment of a second school, and further recommended that it be located at the University of California, Riverside. This latter recommendation was based largely on the availability of space and the agricultural heritage of Riverside. The committee "downgraded" the University's Irvine campus on two counts: the availability of only 75 acres, and the fear that Irvine's preoccupation with developing a medical college would relegate those in veterinary medicine to second-class status.

A school of veterinary medicine obviously needs holding pens and paddocks, isolation areas, and other facilities that are not entirely compatible with an urban environment. The availability, at present, of more space at Riverside for the development of such facilities is a point in its favor. On the other hand, modern educational and research programs in veterinary medicine are more closely resembling programs in human medicine each year. There is opportunity for joint training in such fields as microbiology, biochemistry, physiology, anatomy, and even techniques such as surgery. In many cases research programs are hardly distinguishable, with both groups using identical experimental animals and facilities. On these bases the location at Irvine would definitely be preferable.

Since Riverside does not have a major program in animal science and there seems to be little justification to initiate one, the agricultural "tradition" does not appear to be an overriding argument for locating the school at Riverside.

Veterinary educators are divided on the relative merits of association with agricultural or medical schools. An increasing number appear to be leaning toward the latter from the standpoints of both quality of education and research and cost effectiveness. Few seem to be overly concerned about being considered "second-class" citizens.

CHAPTER X

RECOMMENDATIONS AND GUIDELINES

Higher education in agriculture in the State of California has evolved and prospered primarily because of the sensitivity of those involved to the needs of the industry which they serve. It has experimented with and innovated new programs, new organizational structures, and new approaches to instruction. Those that in its evaluation were good have been retained. California higher education has served as a pattern for the development of programs throughout the country and stands today the envy of most other states.

This is not to imply that the present system does not have defects, that it cannot be improved, or that it can continue to expand without guidelines and supervision. To even the casual observer it is apparent that there is aloofness and "empire building" within the academic community; it is prone to cling to traditional values beyond their usefulness and to be slow to respond to new needs. Unnecessary duplication of effort exists on both the inter- and intra-institutional levels, and unhealthy competition for students and programs has developed.

One cannot question, however, the motivation of those within "the system." Almost without exception, those who serve agriculture in higher education in California are completely dedicated to the task of bringing the finest in training and education to the youth of the State.

The role of the consultant is to analyze in an unbiased but knowledgeable manner the present status and trends of a situation.

Through experience in different settings, from knowledge of trends, from reading, and from first-hand observation, he attempts to establish guidelines, make suggestions, and formulate recommendations that in his best judgment will lead to the improvement of the system under study. To be unbiased implies the lack of vested interest in or of overfamiliarity with the object of study. Paradoxically, this leads to his ignorance of certain major and minor pressures that bear on the issues, and hence, to the feasibility of certain recommendations.

It is with an awareness of these shortcomings that this consultant makes these suggestions and recommendations. It is hoped that they will be received in the same spirit as given, and that they will be adapted by those more knowledgeable of the local scene to the improvement of the programs of higher education in agriculture in California.

1. Intra-Institutional Cooperation

   All new programs, new options, and new courses (as well as existing ones) should be screened on a regular basis to determine if collaborative action would not lead to improvement. Flagrant duplication of courses and programs should be eliminated.

Many situations exist in which improved intra-institutional collaboration would allow both improvement in quality of instruction and better cost-effectiveness. The colleges and divisions of agriculture have not taken full advantage of the expertise in other segments of the institution and have attempted to develop as self-sufficient, self-contained, and highly autonomous units. This results in unnecessary duplication in such areas as motor repair, welding, agricultural business, genetics, entomology, etc. Part of this results from the urge to have full autonomy and part from the insensitivity of members of faculties in other segments of the institution to the curricular needs of students.

2. Inter-Institutional Cooperation

   The Liaison Committee on Agricultural and Natural Sciences of the Articulation Conference should explore ways and means of increasing cooperative efforts between and among institutions. Because of the cost of certain facilities, the need for faculty specialists, and the existence of real but low demand by students for some programs, much could be accomplished through joint use of facilities and manpower.

In its simplest form this could be the extension of the university-wide professorship concept to the State Colleges and Community Colleges. The use of "itinerant" specialists is a possibility. The itinerant teacher could offer "short courses" or teach specialized skills at a number of different institutions. In the case of programs requiring special facilities (e.g., milking parlors, food processing laboratories, etc.), students from a number of campuses could be assembled for a "short course" or a full quarter on the campus of one institution for intensive specialized instruction. Through the use of syllabi and other devices supplied by the "master teacher," the instructors at the participating schools could prepare their students for this specialized-training experience. The University campuses, the State Colleges, and a few of the better-endowed Community Colleges could supply both faculty and facilities for such specialized short-term training. In other cases, several institutions in a region could develop facilities jointly rather than attempt to duplicate them.

3. Control on the Expansion of the Scope of Programs in Agriculture

   Units of agriculture in academic institutions must awake to the realization that they no longer have a corner on the expertise for problem solving or the concern for those problems. It is imperative that colleges of agriculture join together with other elements of the institution in both instructional and research programs. They have been apart from the rest of the academic community too long. The high level of autonomy which they enjoy is obsolete, and steps should be taken by all administrators to break the expensive barriers that distinguish one college or division from another. In the eyes of the student and in the totality of knowledge, such distinctions do not exist.

For years colleges of agriculture were criticized for their preoccupation with production agriculture to the neglect of other aspects of the industry. During this period other elements of the university or college moved to occupy the void. When agricultural colleges awoke to the potential of the nonproduction areas of their discipline, they moved quickly into "agribusiness" and other areas, only to find themselves in competition with other disciplines.

4. University and State Colleges: New Programs

   There should be no extension of formal programs in agriculture to additional campuses of the University or State College Systems.

The needs of the State for baccalaureate and graduate training can be adequately covered by the campuses presently involved: the University of California at Berkeley, Davis, and Riverside; California State Polytechnic College, Pomona; California State Polytechnic College, San Luis Obispo; Chico State College; and Fresno State College. This is not to suggest that certain courses in or related to agriculture should not be offered on other campuses of the University and the State Colleges for the enrichment of programs of students in the basic sciences, the social sciences, and the humanities. Survey courses in California and/or world agriculture (perhaps taught within the geography department) would be useful to the many students from nonagricultural curricula who enter the agricultural industry.

5. All Institutions: New Options

No new option should be approved without close examination of the possibility of collaborative effort with other units of the institution (e.g., wildlife and forestry with biology, agricultural business with business, welding and tractor repair with related technical departments).

Because the field of agriculture is changing there will continue to be pressure for new "majors." Some of these will be valid and should be justified on the same criteria as new programs in agriculture: need by industry, desired characteristics and competencies of employees in other than agricultural skills and knowledge, lack of available programs within commuting distance, demand by students, etc. The tendency to initiate new majors in response to current "fads" should be discouraged. Some new programs will draw students from other, perhaps redundant, options. As new majors are proposed, the college administration should continue to carefully evaluate the impact on existing options. Periodic review of every option (and course) should be made by the administration in an effort to eliminate those that are redundant, duplicatory, and nonviable.

6. Excessive Course Offerings

Thoughtful curricular reform is definitely needed.

In most institutions there are an excessive number of courses listed in the catalogue. This is most acute in the Community and State Colleges, and to some extent at the upper division level in the University. The total number in academic programs could be reduced by 25 to 50 percent. This is not to imply that similar reductions should be sought in the vocationally oriented short courses.

Within many academic programs, there is excessive duplication judged by course descriptions (and outlines), some obviously obsolete courses or sections of courses, and some courses that appear to be offered more to satisfy the ego of the instructor than because of need in the curriculum. Some instructors are responsible for (or are required to teach) as many as twelve to fifteen different courses covering a wide range of disciplines.

Courses can be consolidated and restructured. Others can be eliminated. In several cases, stricter adherence to the requirement for prerequisites would remove unnecessary duplication. It is possible for one course, properly structured, to service a broad spectrum of students.

7. Credit for Judging Courses

It is recommended that courses in judging livestock and other agricultural commodities be discontinued as credit offerings.

Judging is a valid part of the art of evaluation and should be included as a portion of a general course in that area. The continuation of specialized offerings in judging overemphasizes the importance of subjective judgment. The sponsorship of judging teams in intercollegiate competition as a means of motivating students is acceptable as an extracurricular activity, although one can question the validity of the time spent in participation and of the true value of the activity to either the student or the institution.

8. Work Projects: Supervision and Credit

No more than four semester (or six quarter) hours in "supervised work projects" should be allowed for credit toward the Associate of Arts degree or for transfer. No more than eight semester hours in this type of endeavor should be applicable to graduation requirements for the baccalaureate degree.

This is a harsh recommendation and it carries no implication that the use of "supervised work projects" is not an excellent learning technique. The recommendation is based on the excessive abuses of the practice at present. A study is sorely needed that will validly measure the efficiency of this method of acquiring information, learning skills, and changing attitudes. Although very popular with technical education instructors and students, its excessive use is questioned.

9. Berkeley: Undergraduate Program

   The undergraduate program in agriculture at Berkeley should be retained despite low enrollments in many of the separate majors.

The program has an academic quality that is not duplicated elsewhere in the country. The research program of the Agricultural Experiment Station and the graduate training program contribute to and in many ways underwrite (e.g., faculty, facilities, library holdings) the effort in undergraduate instruction. There could be some reduction in cost effected through closer collaboration with other elements of the campus. (For example, the undergraduate major in entomology could be offered jointly with the related biological science departments; more joint appointments made between agricultural economics and the School of Business Administration, etc.) The undergraduate program at Berkeley could be moved and amalgamated with Davis and/or Riverside, but the loss to the State, national, and international agricultural community would heavily outweigh the gains of eliminating some high-cost programs.

10. Berkeley: Agricultural Science Option

   Instead of being a single basic "agricultural science" major, the Agricultural Science option is, in fact, an "umbrella" title under which several majors are offered. Despite the fact that it effectively hides the limited numbers of students in the separate disciplines, it remains a low-enrollment, high-cost program. Since the great majority of the graduates of this option continue on to graduate school, the present degree of flexibility is not essential. In concept, the program is good and it can be justified as a means of producing potential graduate students. Only the degree of specialization is questioned and it is understood that this problem is currently under study. Other departments that have retained their separate majors would do well to reduce their requirements for upper division work in their departments and join in the agricultural science option to the mutual benefit of all.

11. Riverside: College of Biological and Agricultural Sciences in Concept and Practice

The concept of a College of Biological and Agricultural Sciences is most exciting and offers an ideal means of welding the talents and interests of the basic and applied scientists on a broader front than has been attempted before. It does not, and should not, mean that the biologists become slaves to agriculture or limit their interests to areas of immediate concern to agriculture. Hopefully, the biologists will be sensitive to the needs of agriculture and the agriculturalists will be able to see the long-range value of "pure" biology. There should be an increasing amount of communication and collaboration. For the good of both biology and agriculture nationwide it is hoped that this happy wedding will be given maximum opportunity to succeed.

12. Riverside: Animal Science

> The College of Biological and Agricultural Sciences on the Riverside Campus of the University should not initiate a full-scale program in Animal Science unless there is a major change in manpower needs of the industry.

The program at Davis (Agricultural Genetics, Animal Science, Nutrition) has the capacity to saturate the manpower needs of the industry at the research level and this program, plus those in the State Colleges, can similarly supply the need for baccalaureate graduates.

There is need for introductory (survey) courses in the animal industry for students in Agricultural Economics and other options. Because of the unique problem of the livestock industry in southern California there is need for personnel of the State Agricultural Experiment Station to engage in research in the area. Possibly an area other than the immediate Riverside campus would be more appropriate for it.

13. State Colleges: Mission and Emphases

> The State Colleges as a group should define more precisely their mission and their role in the total higher education hierarchy within the State.

At present the State Colleges resemble the land-grant colleges of a generation ago -- attempting to be all things to all people. On one hand, they train high quality technicians; on the other, and all too often in the same classes, they attempt to prepare students for graduate study. They would like to emulate the University in establishing research and graduate training programs and yet they cling to class credit for judging teams and for "supervised work activities." Their mission does not need to be so narrow as to exclude the training of either the technologist or the potential graduate student, but the meaning of a baccalaureate degree from a State College does need clarification. The Colleges must establish comparable standards at the B.S. level and for the admission of the transfer student.

Although the areas of emphases of the several State Colleges are reasonably clear at present, considerable duplication of effort (and cost) could be avoided if, by working with the Chancellor's Office, these were more clearly delineated, certain duplicate programs reduced or eliminated, and even some transfers made of faculty and facilities. The present tendency is to try to introduce any program that is popular elsewhere in an effort to gain enrollment. Pomona probably should not be in the animal business above the lower division level, but should concentrate on ornamental horticulture, other aspects of horticulture, and perhaps farm crops. San Luis Obispo, which presently has the broadest program, might well deemphasize some of their areas. Similar planning for Chico and Fresno are possible. The monies saved on each campus from reduction in scope of program could be used in an effort to develop excellence in their chief areas of emphasis.

14. State Colleges: Lower Division Programs

It would be highly desirable if the State Colleges, in concert, could agree on a two-year core program in agriculture, a stronger two-year program in the basic sciences and general education component, and retain a minimal number of electives that may be needed to motivate some students.

It is not intended that the four Colleges be mirror images of each other. The divisions and departments must be given freedom to develop their own courses, to innovate new methods and approaches, but since they draw so many transfer students from the Community Colleges it is only reasonable that they should adopt some reasonably similar standards and curricular patterns as a guide to the Community Colleges.

Such weaknesses as may exist in the State Colleges stem in large measure from the unwholesome competition that exists among them for transfer students. The need to establish guidelines for the acceptance of transfer students is developed elsewhere in this report, but if these recommendations are followed it will be necessary for the State Colleges to correct certain weaknesses in their own programs. There are entirely too many lower division courses. In most departments and options the number could be reduced by 50 percent or more. A study of the titles, descriptions, and in some cases, outlines suggests excessive duplication exists.

15. State Colleges: Technical Agriculture Program

The Office of the Chancellor should initiate an analysis of the sub-baccalaureate technical agricultural program at California State Polytechnic College, San Luis Obispo. This analysis should determine the need for the program in view of the increasing number of technical programs in the Community Colleges and its influence on the baccalaureate program.

16. State Colleges: Acceptance of Transfer Students

It is strongly recommended that, by *joint* action, the State Colleges sharply restrict the work for which they will give transfer credit toward the baccalaureate degree to a level no greater than that permitted of their own "native" students. Recommended is a maximum of 18 semester hours (or equivalent) of courses in agriculture including not over four units for "supervised work" activities. Until a mechanism can be devised using some features of "programmed" instruction which will allow students to build upon the base which they have in an area, credit should not be allowed for courses taught without the prerequisite that the comparable course has at the State College.

Standardization of transfer regulations will not only give better guidance to the Community Colleges and potential transfer students, but will allow the development of sounder curricular patterns within the State Colleges.

17. State Colleges: Master's Degree Programs

The master's degree programs offered by the State Colleges have not yet achieved sufficient stature that their long-term potential is evident. The Office of the Chancellor for the State Colleges should undertake a critical examination of them with particular regard to need and quality. Those that have genuine potential should be supported; those lacking it should be discontinued.

18. Individually Prescribed Instruction Techniques

The use of the "process approach" or Individually Prescribed Instruction (IPI) techniques should be carefully examined as an improved method of enabling the smooth transition of transfer credit.

Properly administered it would allow a student who had some knowledge of a field (whether from a "nontransferable" course or from practical experience) to build on that background to establish full credit in the course in question. It has great possibility in contrast to the present "all or none" system of transferring credits.

19. Community Colleges: New Programs

Guidelines should be established immediately under which new programs in agriculture may be permitted at institutions not now offering agriculture. New programs should be justified on the basis of actual needs of the local and regional industry. Data should be accumulated and presented not only on the agricultural skills needed, but also on the desired proficiency in mathematics, communication skills, social and psychological characteristics, and understanding of civil government. New programs should be encouraged to contain a stronger "general education" component than most existing ones. No new programs in agricultural welding, agricultural business, etc., should be initiated without careful analysis of possible collaboration with other programs in the college.

Other factors to be considered are the presence of similar programs within commuting distance, willingness of industry to supply in-service training, and internships.

20. Potential Transfer Students: Identification and Treatment

It is imperative that advisers of students in the Community Colleges make every effort to identify potential transfer students early in their academic career. Such students should be encouraged to broaden their backgrounds with courses in the social sciences and humanities as well as in the basic sciences. Formal courses in agriculture should be kept to a minimum.

High potential students, whether transferring or not, should similarly be encouraged to broaden and strengthen their backgrounds in "general education." Being interested in agriculture they will be motivated to continue learning about it both in formal and informal ways; without formal courses they may be less motivated to improve their communication and mathematical skills or their responsibility as citizens.

21. Community Colleges: Short Courses

It is suggested that the Community Colleges, individually and in concert, explore the potential needs and methods of staffing increased activities in the area of short courses particularly designed to fit the needs of the industry.

Many of the Community Colleges have active programs of short courses, night classes, etc., to maximize their service to the community. In some cases these are accepted as part of the regular work load, but in most cases they constitute a source of additional income to the instructor. In view of the rapid changes in the agricultural industry, the need for certain personnel to receive instruction in perhaps a single technique, and the need of others for periodic up-dating of their training, it is projected that the demand for single-objective short courses will increase greatly in the years ahead.

22. Agricultural Education

> A thorough analysis should be made by representatives of all State Colleges and University campuses offering agriculture (whether they have agricultural education programs or not) of the impact of the attempt by some programs to integrate the courses required for certification throughout the undergraduate years as well as the "fifth year."

The view is held by some that this practice gives the schools involved an "unfair" advantage in recruiting and also makes it difficult for those students coming for a fifth year to schedule all certification requirements during the allotted time. There is good reason pedagogically for allowing students to "sample" education courses prior to graduation.

The manpower needs of the State secondary schools for vocational agriculture teachers could be accommodated by two programs. The fact that "Ag Ed" majors find employment in many other fields (e.g., extension, sales) may be sufficient justification to maintain all existing programs, but no expansion should be allowed.

Most programs in agricultural education would profit from closer, if not direct, affiliation with the division of education. Although

"Vo-Ag" teacher programs have unique problems, they would profit from an infusion of ideas from other professional educators.

23. Accountability of Farm Operations

> A uniform cost-accounting system for the operation of farms should be established by the Office of the Chancellor or the President for each of the systems of public higher education.

This might be different for the different types of institutions because of the multiple use made of the facilities by the University and State Colleges. At present no valid estimate can be made of the cost of farm operations that can be charged to the total cost of instruction.

Most college farms are genuine assets to the educational program of the division of agriculture. Others are very poorly run and have a negative educational value.

24. Natural Resources Curricula

> It is recommended that institutions proceed slowly in the development of full-scale programs in the "Natural Resources" areas. A few specialized courses and "short courses" could probably serve a useful purpose on an interim basis.

A variety of new courses and curricula in areas as divergent as fisheries management, forest technology, and parks and recreation have been developed in various units of colleges and universities. They are not always associated with agriculture, although that would seem to be a natural "home" for many of them. There are other elements of every campus that could make desirable inputs into them, however.

The potential job market for persons trained at either the two-year or baccalaureate level is not clear at this time but appears to be limited. Certain needs of a regional nature may be real.

25. Veterinary Medicine

In view of the strong fundamental biology and new medical college associated with the Irvine campus, it is recommended that serious consideration be given to developing a second School of Veterinary Medicine on that campus.

Despite the present freeze on plans to develop a second School of Veterinary Medicine in the State, consideration of the need for and location of a school in southern California is in order. The expansion of class size at Davis will assist in alleviating the shortage of veterinarians but will not solve the problem.

Modern veterinary medicine has much in common (e.g., in training, facilities, and research emphasis) with human medicine. It would appear more critical to affiliate a new school with a school of medicine rather than with one of agriculture.

APPENDIX

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